Photo by Lovisa Kullman
Kearney, Stockholm

No silver bullet

Why the right mix of solutions will achieve circularity in Europe's informal eating out (IEO) sector

KEARNEY

Study background, objectives, and scope

As the transition to a circular economy continues, our study investigates the challenges and opportunities that circularity represents for consumer-facing packaging in the European informal eating out (IEO) sector.[1] All conclusions and recommendations in our study are specific to the European IEO sector and should not be extrapolated to other sectors or geographies without thorough further investigation.

In 2021, the IEO sector generated about 1 million tons of packaging waste. While this figure only represents around 1 percent of total packaging waste in Europe, the very visible nature of the waste produced by the sector (through discarded litter) makes this a high-profile issue—and one that the sector itself has made significant progress toward addressing.[2]

Our study aims to support the European IEO sector's transition to circularity by enabling a fact-based dialogue among stakeholders—outlining and quantifying the impact of different circularity models and specific solutions across economic, environmental, and consumer dimensions.

In this study, we focus on consumer-facing packaging (for example, primary packaging) in the European IEO sector (EU27, UK, Switzerland, and Norway) for both on-premises (referred to throughout as "dine-in") and off-premises ("takeaway") consumption.

We define the "circular economy" in the same way as the European Commission: one that "*aims to maintain the value of products, materials, and resources for as long as possible by returning them into the product cycle at the end of their use, while minimizing the generation of waste*." This definition encompasses all reduce/replace, reuse, and recycling solutions mentioned in this study. In quantifying the environmental impact of each solution, we look beyond waste generation to evaluate the broader climate impact (including projected greenhouse gas emissions (GHGs)).

This study is based on public data sources, industry insights, and proprietary data and analyses, including more than 20 interviews conducted with stakeholders across the value chain. Commissioned by McDonald's in the fall of 2022, the study was conducted independently by Kearney, which is solely responsible for all analyses and conclusions.

Our study aims to support the European IEO sector's transition to circularity by enabling a fact-based dialogue among stakeholders.

[1] We define the IEO sector as limited-service restaurants (including Asian, bakery, burger, coffee shops, Middle Eastern, and pizza segments), self-service cafeterias, juice/smoothie bars, and street stalls/kiosks.
[2] Based on Kearney estimates.

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Chapter 1: The European IEO sector has unique business, operational, and consumer characteristics

As Europe strives to identify the most effective ways to reduce its packaging waste footprint and improve circularity in the IEO sector, it is vital to fully understand and balance economic, environmental, and consumer dimensions when selecting, implementing, and scaling effective circularity solutions for the sector.

The total European packaging waste footprint across all sectors continues to grow (see sidebar: Packaging waste is growing across sectors in the EU on page 4).[3] Since 2010, total packaging waste has increased by approximately 2 percent per year (from 80 million tons to 93 million tons per year in 2019)—slightly lower than the nominal GDP growth of about 2.7 percent per year. If this trend continues, packaging waste in Europe will reach 115 million tons per year by 2030. As Europe (re)assesses how to reduce its packaging waste footprint and improve its circularity, it is important to fully understand and balance economic, environmental, and consumer dimensions that will determine the success of different circularity solutions showcased in figure 1.

[3] Defined in this study as EU27, United Kingdom, Switzerland, and Norway.

Figure 1

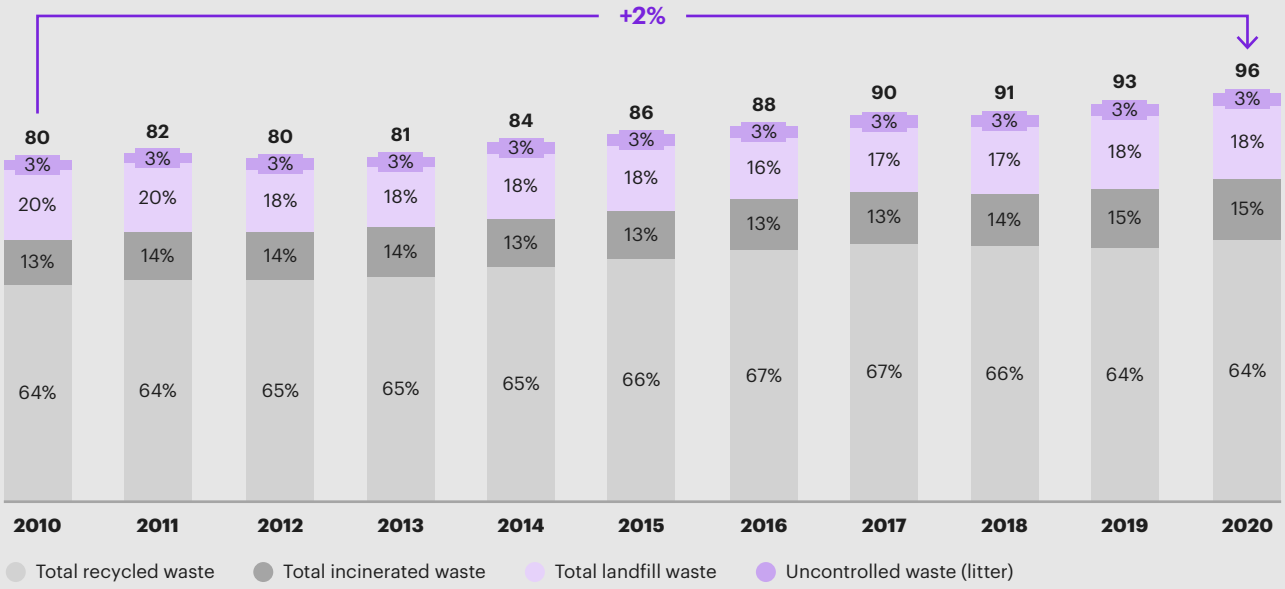
There are three main circularity solutions to consider in the packaging value chain

Sources: Ellen McArthur Foundation report; Kearney analysis

Figure

Packaging waste has grown steadily over the past decade in the EU

Total European packaging waste 2010–2020 (million tons)



Note: percentages may not resolve due to rounding.

Sources: Eurostat; Kearney analysis

Packaging waste is growing across sectors in the EU

— The existing waste management infrastructure in Europe leads to approximately 36 percent of packaging waste being incinerated or ending up in landfills or as uncontrolled waste (see figure).

— Packaging waste is expected to continue to increase, reaching 115 million tons per year by 2030.

— Introducing effective circularity solutions at scale should aim at decoupling economic growth from waste generation.

Europe has targeted greater circularity through multiple frameworks and legislations in the past—following up its circular economy action plan in 2015 with a comprehensive report on its implementation in 2019.[4] However, Europe's strategy to address the packaging waste footprint has largely followed a country-by-country, ad hoc approach, and legislation has historically failed to fully consider sector-specific business models and operational requirements—leading to the creation of complex, fragmented solutions that are hard to implement, measure, and track.

In response to these challenges, the European Union (EU) has revised the Packaging and Packaging Waste Directive (PPWD) to include EU-wide updated targets for recycling and new targets for reuse. In the revised Packaging and Packaging Waste Regulation (PPWR), EU legislators have set out different options to improve circularity in Europe (including recycling, reuse, and compostable solutions), while also accounting for sector-specific considerations.[5] Europe now has a clear opportunity to meet PPWR targets and broader circularity objectives by further refining the right mix of circularity solutions for each particular sector. Achieving these goals requires fully understanding economic, environmental, and consumer dimensions, and ensuring that future policies are informed by fact-based analysis and data.

As Europe continues to move away from a largely linear model ("make–consume–throw away") to a more circular model, it must focus on a holistic "reduce–reuse–recycle" agenda that explores all available solutions across each of these three circularity options.

IEO sector overview

The European IEO sector was valued at about €130 billion in 2021, with a projected growth rate of about 6 percent per year until 2030. Increased consumer demand is likely to be driven by a combination of factors, including novel menu items catering to a wider demographic, a sharper focus on convenience through online ordering and at-home delivery (a trend accelerated by the COVID-19 pandemic), and affordability. Approximately 70 percent of the sector's revenues today (compared to about 60 percent in 2018) are driven by takeaway (including drive-thru and at-home delivery)—a split that is projected to widen in the coming years as delivery services continue to grow in popularity.

Approximately 70 percent of the IEO sector's revenues today are driven by takeaway.

[4] European Commission: a circular economy *"aims to maintain the value of products, materials, and resources for as long as possible by returning them into the product cycle at the end of their use, while minimizing the generation of waste."*

[5] Compostable solutions mentioned in the PPWR proposal focus on plastic compostable packaging, including plastic bags, tea bags, and coffee pods.

Ownership structure

The IEO sector is highly fragmented, with the top 10 players accounting for less than 30 percent of the market. Its ownership profile is equally fragmented, with an estimated 320,000 individual business owners across Europe. This is largely driven by the split between franchisee-owned versus independently owned stores (see figure 2).

We estimate that about half of the market consists of chains, many of which operate under a franchise model. In this model, thousands of individual business owners ("franchisees," typically small-to-medium enterprises (SMEs)) operate their store under the chain's "franchisor" umbrella. A franchisor—such as Pizza Hut, KFC, or McDonald's—supports the franchisee in setting up (for example, by providing a standardized set of assets) and running (for example, by providing menu and operational guidelines) the store. Nevertheless, the franchisee is an independent entrepreneur and ultimately has ownership of its P&L and day-to-day operations, including waste management. In contrast, the remaining half of the IEO sector in Europe is composed of independent (non-franchised) players. These IEOs are typically smaller, family-owned or "mom-and-pop" stores, with full ownership and responsibility for day-to-day operations, including regulatory compliance.

Figure 2
The IEO sector in Europe is highly fragmented

	Chains **54%** of the market size **~25%** of stores		**Independent** **46%** of market size **~75%** of stores
Brand types	**Relatively concentrated, ~600 brands**		VS **Fragmented, >100,000 brands**
Ownership models	**Franchise stores**	**Company-owned stores**	
Description	Mix of franchise models, from **single-unit** franchise agreement where one franchisee has the right to operate one unit, to a **master franchise agreement** where one master franchisee is granted operating control of a specific territory and can grant other franchises rights to operate stores in that territory	Company **owns and operates** stores in parallel or instead of the franchise model	Mainly **family businesses**, with **no affiliation to other businesses**. Can operate up to 10 units under the same brand but not considered a chain.
Packaging solutions	Typically centralized	Centralized	Decentralized (no central unit)
P&L control and responsibility	Decentralized to each franchisee	Centralized	Decentralized (no central unit)
Waste management responsibility	Decentralized to each franchisee	Centralized	Decentralized (no central unit)
Investment decision	Central guidance, decentralized decision and execution	Centralized	Decentralized (no central unit)
Estimated # of owners	**~80,000 different business owners/franchisees operating the stores**		**~240,000 individual owners**

Sources: Euromonitor, IBIS World; Kearney analysis

Consumer expectations

IEO consumers have a unique set of demands to those within the broader restaurant sector:

— **Convenience.** Consumers expect easy access to—and navigation around—restaurants, and around-the-clock opening hours. Above all, they expect their food to come in a format that can be easily consumed at home or on the go.

— **Speed.** Consumers expect to get their food within minutes of ordering—whether they are eating it on the premises or at home.

— **Affordability.** Consumers expect value for money (for example, the average price of a fast-food meal in Europe is around €4) and are typically more price-sensitive versus other sectors. This limits the extent to which IEO players can fund circular solutions by incrementally increasing costs for consumers before this starts to erode margins.

IEO players have increasingly tailored their menus, in-store operations, and packaging to serve consumers quickly, safely, and effectively both in restaurants and at home.

Meeting these consumer demands requires IEO players to develop or improve on a unique set of business model and operational characteristics that directly influence today's IEO packaging portfolio—and on the waste the sector generates:

— Strategic focus on **takeaway sales channels** (including drive-thru and delivery), boosted by mobile ordering and third-party delivery platforms. IEO players have increasingly tailored their menus, in-store operations, and packaging portfolio to serve consumers quickly, safely, and effectively both in restaurants and at home. While the usage and development of takeaway channels started long before the COVID-19 pandemic, they were vital for many businesses to survive lockdowns, while giving customers easy access to meals.

— With **affordable pricing** being a priority, IEO players focus on delivering high volumes alongside optimized operating costs. IEO players often use efficient in-store processes and operate stores with limited space (particularly those based in urban locations). In addition, over recent decades, packaging items have been optimized for better material and cost efficiency, resulting in the emergence of low-cost solutions. With IEO players now gradually moving to more sustainable packaging solutions, cost pressures are again being ramped up.

— Focus on **self-service, putting the onus on the consumer** to ensure speed and high turnover. For example, consumers can be prompted to order via kiosks, pick up their food at the counter, and bin their waste once they are finished.

— Optimized and **streamlined in-store operations** to quickly serve customers. For example, menu items are typically prepared in advance and packaged individually, especially during peak hours.

Waste footprint

Generating about 1 million tons of packaging waste in 2021, the IEO sector represents just about 1 percent of total packaging waste in Europe. But this waste is highly visible through littering, making the sector top-of-mind for European consumers, corporations, governments, and civil society stakeholders. This is primarily due to the sector's high reliance on takeaway, where there is limited influence on consumer behavior and limited availability of sorting and collection facilities in communities, which are typically managed by local municipalities and private waste companies. While IEO packaging is increasingly designed to be recycled, its unique characteristics make this a challenging task. This is due to factors including food contamination, the use of multi-material packaging (which, while recyclable, requires more steps across the value chain to effectively recycle), and relatively small volumes which weaken the business case for recyclers and sorters to accept foodservice packaging waste and adjust their processes to handle this waste.

Despite low data visibility for the sector, Kearney's analysis estimated several packaging items have recycling rates below 15 percent. This is typically driven by inadequate collection/sorting infrastructure, a multi-material mix that lowers recyclers' acceptance of these materials (for example, cups), and a high level of food contamination by grease and other ingredients that are also challenging to manage during the recycling process. The recycling of a multi-material packaging unit requires an additional step in the recycling process because materials need to be separated before they can be recycled. Recyclers, driven by the end-market demand for recycled materials, often choose to accept easier-to-recycle items instead of other packaging that requires a longer recycling process (for example, multi-material, and food-contaminated packaging). Additional efforts are required at a European level to gather more data on recycling rates and further pinpoint key challenges across the value chain (explored in more detail in **chapter 4** under policy recommendations).

The sector's packaging waste footprint is driven by nine key packaging types, which fall into the scope of this study (see figure 3 on page 9). Eighty percent of materials are fiber based (56 percent board and 24 percent paper), with only 7 percent of items plastic based—a figure that is expected to further decrease through the EU Single Use Plastics Directive and growing commitments from corporations to reduce their plastic packaging waste footprint. In addition, around 13 percent of packaging is composed of a mix of both paper and plastic materials—often driven by the need to ensure packaging quality and food safety (for example, the plastic liner used for cups). Based on the current trajectory, the sector's packaging waste is expected to increase to 1.7 million tons by 2030—an overall CAGR of 6 percent, in line with projected sector sales growth.

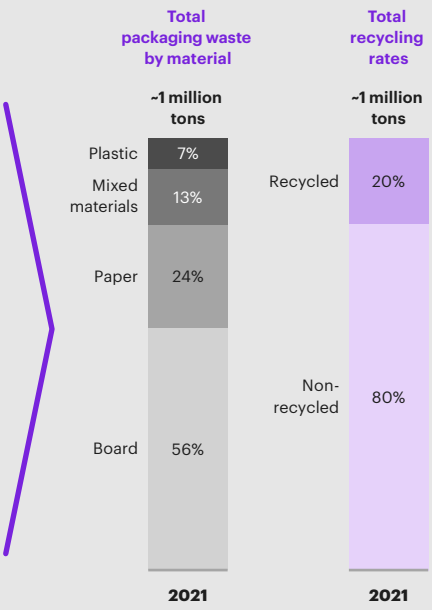
The IEO sector represents about 1 percent of total packaging waste in Europe.

Figure 3

There are nine basic packaging types in the European IEO sector

2021

	Composition and material	Estimated weight, thousand tons, % of total	Estimated units, billion units, % of total	Estimated % of recycled for dine-in waste	Estimated % of recycled for takeaway waste
Bags	Paper	150 (15%)	12.6 (13%)	50%	30%
Napkins	Paper	60 (6%)	31.9 (34%)	<5%	<5%
Cups	PE + board	130 (13%)	10.7 (11%)	10%	5%
Plastic bottles	PET	40 (4%)	4.6 (5%)	50%	40%
Folding carton	Board	210 (21%)	14.2 (15%)	20%	10%
Pizza box	Board	340 (34%)	2.2 (2%)	20%	10%
Paper wrap	Paper	20 (2%)	9.6 (10%)	<5%	<5%
Plastic container	PET	10 (1%)	0.7 (1%)	20%	10%
Lids	Polystyrene	20 (2%)	6.9 (7%)	40%	20%
		~1 million tons	~90 billion units		



Sources: Euromonitor; Kearney analysis

Circularity progress to date and key barriers

The European IEO sector has made significant strides toward greater circularity and has focused on multiple initiatives (covered in more detail in **chapter 2**)—such as investments and innovations in more efficient recycling processes—and on the overall reduction of plastic materials used across the packaging portfolio. However, there are several significant barriers standing in the way of progress:

1. **A business model focused on takeaway consumption.** The sector's 70 percent focus on takeaway is a key barrier for waste reduction: its dominance restricts the influence on consumer behavior and limits opportunities to reduce packaging. For example, even if the IEO sector were to implement best-in-class recycling systems with proper consumer education for its dine-in consumption, this would still only address about 30 percent of the total packaging volume.

What's more, there is little to no visibility into how consumers behave when eating takeaway, or what happens to packaging waste (see figure 4 on page 10). Studies show that takeaway food is often the major driver of visible littered waste.[6] A UK study reveals that 50 to 88 percent of littering identified came from takeaway packaging items such as wrappers and cups. In addition, a study by the sustainability consultancy Eunomia estimated that every 25th disposable coffee cup in the UK is discarded on the street. When consuming on the go, the average consumer does not typically recycle packaging waste. This is partly due to the lack of available public recycling infrastructure for takeaway waste, which limits the consumer's options and leads to lower recycling rates than when dining in, where the right infrastructure is more common.

[6] This study assumes that all takeaway sales equate to takeaway waste volume, which may slightly overstate takeaway waste volume as some IEO players collect waste near premises.

Figure 4

There is little to no visibility into consumer behavior, or what happens to packaging waste, in the takeaway segment

	Approximate revenue share for channel	Source of packaging	Packaging	Channel	Location for waste disposal and source collection	Post-collection sorting and waste management
Dine-in	30%	IEO	Single-item packaging on tray	Dine-in	On-premises	Municipal waste stream and/or private recyclers
Food to go	35%	IEO	Single-item packaging in bag, single-use packaging	Food to go	Off-premises (for example, home, office, public)	— Litter — Recycled — General waste stream
Home delivery	25%	IEO	Single-item packaging in bag, sometimes transport supported packaging	Home delivery	Off-premises (for example, home, office, public)	— Litter — Recycled — General waste stream
Drive-thru	10%	IEO	Single-item packaging in bag	Drive-thru	Off-premises (for example, home, office, public)	— Litter — Recycled — General waste stream

On-premises Off-premises Limited influence

Key takeaways

— 70 percent of IEO sector waste is driven by takeaway consumption.

— IEO players have limited visibility and influence on consumer behavior and waste generation.

— Even across waste that is collected on-premises, IEO players typically have limited insights into what happens to waste once it reaches municipal waste streams.

— Takeaway—the primary growing segment for the sector—represents a key area of opportunity.

— There is a lack of visibility and accountability around waste collection, management, and recycling—a problem that extends beyond the IEO sector.

Note: This study assumes, driven by existing low data visibility, that all takeaway sales equate to takeaway waste volume, which may overstate takeaway waste volume as some IEO players collect waste near-premises.

Sources: Euromonitor; Kearney analysis

2. **Complexity introduced by strict food safety requirements.** Food quality and safety requirements are critically important for packaging in the IEO sector. Packaging must preserve temperature and taste, enable consumption on the go, and more importantly, safeguard the integrity of the product and avoid any migration of contaminants or allergens. Safety concerns mean that the use of recycled content in foodservice is heavily restricted by law, with markets also requiring information on ingredients and allergens to be included in the packaging. Foodservice packaging is therefore complex, often comprising different materials (for example, a plastic liner for paper cups to hold the liquid inside) or designed specifically to meet a certain food safety/quality purpose. Without proper controls, measures to reduce waste and to drive circularity could adversely affect food safety.

3. **Lack of existing incentives for recyclers to recycle foodservice packaging waste.** To boost recycling rates for IEO packaging waste, infrastructure changes are needed to pre treatment, material recovery facility (MRF) design, and recyclers' acceptance. Packaging is often contaminated and sometimes comprises more than one material for food safety reasons. And even when used packaging remains in the waste management value chain and is placed in the right recycling container (after dine-in or takeaway), recyclability may still be low in commonly used waste treatment facilities that are not always designed to accept foodservice packaging waste such as greasy paper pizza boxes or multi-material paper cups with plastic liners. The two key barriers to recycling foodservice packaging waste are typically:

— **Ability to sort materials (pre- or post-collection).** Sorting can be undertaken by the customer, at source; by an MRF after collection; and often by both. MRFs are used before the recycling process to sort recyclable materials into single-material waste streams. Since these are not designed for foodservice packaging that is typically contaminated or made of materials other than plastic (which the IEO sector uses little of), composed of some degree of mixed materials, and often of varying quality (from a clean carton to a soaked cup), this makes the process of sorting foodservice packaging a complex one: sorting is not always offered for consumers at source, and even if it is offered, foodservice packaging is not always accepted by the sorting system. If sorting is in place, food packaging can be recycled directly by a recycling facility, sorted by an MRF and then recycled by a recycling facility, rejected and sent directly to landfill or incineration, or rejected after being sorted by an MRF (and eventually also ending up in landfill or incinerated).

— **Recyclers' ability and willingness to recycle the materials.** It is typically costly and inefficient for recyclers to recycle IEO packaging waste in the pulping process (for paper) and in the mechanical recycling process (for plastic) and convert it into similar-value materials. For example, even where cups are sorted properly at source or at MRFs, they are typically not accepted by recyclers: this is because they take longer to pulp due to their plastic lining—lowering the incentives and business case for collection and recycling. Likewise, recyclers often do not accept greasy pizza cartons and plastic containers because of food contamination issues. Although the technologies to recycle them exist, recyclers themselves typically consider that the relatively low volumes of IEO packaging waste involved do not justify the added effort involved in processing them.

See figure 5 for what is top of mind for IEO players

Driven by high cost, recycling facilities typically focus their efforts on "clean waste" (such as newspapers) instead of "dirty waste" (such as paper derived from foodservice packaging waste). Europe must now capitalize on the ongoing momentum driven by circularity economics, consumer behavior, and legislation to build a holistic circularity strategy that leverages a combination of reduce/replace, reuse, and recycle solutions. It must also tailor that strategy to the IEO sector's specific business models and operational requirements, ensure accountability and visibility across the value chain, and address a balance of economic, environmental, and consumer outcomes.

Economic. Understanding the financial and economic impact required to implement and scale circularity solutions across public and private sectors. This primarily includes introducing the required infrastructure upstream and downstream to make circularity solutions economically feasible, and making improvements to existing packaging solutions, or developing new ones.

Environmental. Understanding the full environmental impact of circularity solutions—looking at waste volumes generated, GHG emissions, water usage, and energy consumption across the full value chain.

Consumer. Understanding the adverse impact of consumer behavior on the growing packaging waste footprint, and the incentives and consumer education required to change it.

Figure 5

Inflation, supply chain constraints, and labor shortages remain top of mind for the IEO sector

Concern	Description	Outlook (2–5 years)
Inflation	— **The food producer price index in the EU increased by 22% in August 2022** (vs. August 2021), largely driven by **increased energy prices**, impacting production costs. — **Inflationary pressures** are forcing IEOs to increase prices and reduce meal sizes to protect margins.	**Slight improvement expected** — Inflation is expected to remain elevated in the EU, but stagnate to ~4.5% in 2024, according to the IMF.
Supply chain constraints	— **Global supply chains are still challenged**, driven by continued lockdowns in China, the Ukraine war, and the lingering COVID-19 pandemic. — Key supply challenges for foodservice include chicken, sunflower oil, and various vegetables, causing some players to adjust offerings.	**Improvement expected** — Indices such as the GSCPI show that supply chains have been easing and are reverting to normal.
Labor shortages	— EU27 **unemployment rates are at an all-time low** of around 6%, ranging from 2% (Czech Republic) to 12% (Spain), and vacancy rates are at all-time highs of ~3%, meaning that 3% of European jobs are unfilled. — The labor challenge is evident in the foodservice sector, **where online job postings increased by 29% the past year** following the COVID-19 recovery.	**No improvement expected** — Labor shortages are expected to persist in the EU over the coming 5 years, according to forecasts by ECB.

↑ Positive outlook → Neutral outlook ↓ Negative outlook

Note: GSCPI is the Federal Reserve Bank of New York's Global Supply Chain Pressure Index.

Sources: Eurostat, CEDEFOP, ECB, IMF, GSCPI; Kearney analysis

Chapter 2: Adopting and scaling effective circularity solutions creates challenges and opportunities for the sector

Adopting effective circularity solutions at scale comes with both challenges and opportunities. Challenges include requirements to use packaging meeting food-grade standards, under-developed waste infrastructure upstream and downstream, and consumer behaviors that are difficult to influence and change. But some clear opportunities also emerge—such as the ability to build on and scale existing infrastructure of well-established circularity options like recycling, and the potential to explore and introduce reduce/replace and reuse circularity solutions in the IEO packaging portfolio.

Circularity aims to minimize waste leakages in the economy by reducing, replacing, reusing, and recycling waste across the value chain as much as possible, including repurposing of products when they reach the end of their useful life. This end-of-life stage starts when consumers dispose of packaging, which could see the waste going down different routes, with different environmental and economic impacts. We have assumed four main end-of-life outcomes for waste in a circular economy: recycling, anaerobic digestion, industrial composting, and incineration.[7,8,9] All these end-of-life outcomes capture some form of value from waste (for example, through materials, compost and soil nutrients, biogas, or energy).

Selected examples of circularity in the IEO sector

Circularity is nothing new for players in the European IEO sector. In 1998 Starbucks introduced a "bring your own cup" system tied to loyalty and reward programs for consumers, and Subway installed recycling stations in 2007. More recently, MAX Burgers changed all its cup lids from plastic to cellulose fiber lids in 2021 (requiring 25 percent less material) and Burger King started to use reusable cups for in-store consumption across some markets in 2022. In addition, McDonald's has also pledged that by 2025 all packaging will come from renewable, recycled, or certified sources that involve no deforestation. Outside of Europe, significant strides are also being made toward circularity in the IEO sector; for example, KFC Canada has pledged to introduce a fully compostable packaging portfolio by 2025.

To date, investment in circular solutions in the European IEO sector has focused on recycling and, to a lesser degree, on reduce/replace and reuse circularity solutions. This has primarily been driven by historic European mandates on recycling targets and bans on certain packaging materials, fueled by favorable consumer sentiment toward recycling. However, reuse models have recently gained policy traction at European and member-state level, accelerated by a growing recognition that current reduce/replace models are saturated, that recycling infrastructure is, despite efforts, still largely inaccessible, and that new solutions are now required to reduce Europe's waste footprint. Before taking a closer look at specific challenges and opportunities, there are several examples of past and ongoing circularity efforts in the European IEO sector that are worth exploring.

[7] Anaerobic digestion is an end-of-life waste operation that is made up of several processes where bacteria and microorganisms break down waste into organic matter. This process results in biogas as well as digestate which are both materials that are fed back into the economy.
[8] Industrial composting is an end-of-life waste operation that implements composting on a large scale to decompose organic material into high nutrients that can be repurposed for agriculture or other purposes.
[9] Incineration is an end-of-life waste operation that burns waste at high temperatures to generate energy that could be stored and used again.

Reduce/replace. Brands have increasingly been reducing plastic within packaging and shifting to certified fiber alternatives. For example, McDonald's is reducing its plastic use by switching to paper straws in the EU, using strawless fiber lids for cups (in other words, cups designed to work without straws), and replacing plastic lids from McFlurry packaging with a foldable fiber flap. Meanwhile, Starbucks is phasing out plastic straws worldwide and replacing them with paper straws or straw-less drink lids; Chipotle uses compostable takeaway bowls, utensils, straws, and napkins; and Subway is now only offering cutlery and napkins when customers request them. The common thread across all these examples is the strategic decision to eliminate or reduce post-consumer waste requiring downstream collection, sorting, and end-of-life treatment.[10]

Reuse. Reuse models in food consumption are still in their infancy relative to other circularity options, and full visibility into the extent of economic, environmental, and consumer outcomes remains unclear. However, countries such as France and Germany have rolled out reuse models in the IEO sector as a response to—or pre-emptive measure against—country-specific reuse mandates and regulations. For example, it is expected that by early 2023, German restaurants (not only IEO) with more than 80 square meters and five employees will be required to offer reusable packaging for takeaway consumption. Players in Germany—such as McDonald's and the HEM fuel service station chain—have developed their own reusable deposit system, where consumers are offered reusable packaging for a €1 deposit that is redeemed upon returning the packaging. To date, McDonald's trials show limited uptake and return rates. In contrast, an HEM study states that nearly 80 percent of German consumers believe mandatory reuse targets should be introduced for takeaway. In parallel, the French model focuses on in-store consumption, requiring large foodservice providers to serve both food products and beverages in reusable containers.

Recycle. Chains including Burger King, Prêt-a-Manger, and Costa Coffee have made significant investments into consumer education, novel packaging, and infrastructure to improve collection, sorting, and recycling rates. Similarly, as part of a broad global strategy to encourage positive consumer behavior, McDonald's launched a marketing campaign called "Bin it to Win it," partnering with LitterLotto in the Netherlands to reward consumers who dispose of their waste responsibly. IEO players have also invested in boosting end-market demand through initiatives such as:

— Deposit systems

— Watermarking technology[11]

— Installation of in-store recycling stations

— Optimization of packaging to increase recyclability

— Investment in consumer education to increase proper waste disposal and recycling through commercials, campaigns, and staff training

Players have also invested in better treatment of waste, and to improve acceptance from recyclers through close collaboration across the value chain. Meanwhile, other players have created their own recycling loops, owning the end market of the recycled material either by managing their own recycling facilities or by partnering with key packaging and waste management companies to improve the recyclability of plastic material (for example, Cojean in France).

These examples all highlight a recurring set of requirements, challenges, and opportunities involved in selecting and scaling effective circularity solutions for the European IEO sector. Challenges and opportunities must be mapped based on the economic (cost and benefit), environmental (life cycle assessment (LCA)), and consumer (expected impact on behavior, affordability, and experience) dimensions, as introduced in **chapter 1**.[12] In the next section, we take a closer look at each of these dimensions in detail.

[10] Replacing plastic with, for example, paper or compostable still requires some end-of-life treatment.
[11] Digital watermarks are an enabling technology that enhance the sorting process of plastic packaging by embedding an invisible and unique printed code that holds information about the packaging material. At recycling centers, high-resolution cameras can detect these watermarks and accurately sort the packaging.
[12] In this study, life cycle assessment focuses on waste generation and greenhouse gas emissions.

Circularity solutions: challenges and opportunities

Circularity option #1: reduce/replace

In this section, we focus on the opportunity to further expand the role of compostable packaging in the IEO sector's packaging portfolio. (See sidebar: A note on compostable packaging for more details on compostable packaging.) While there are other solutions that could be considered as part of the reduce/replace circularity option (mainly the reduction in material used in packaging, the introduction of alternative packaging components to improve recycling rates, and/or the further shift away from plastic to fiber materials), this study focuses on compostable solutions because the IEO sector has to date explored other reduce/replace options to a greater extent. However, there could be additional opportunity for further reduction of plastic materials and further design and innovation to identify other reduce/replace solutions beyond compostable solutions—this opportunity should also be explored by the sector.

Economic challenges and opportunities

— **Availability of compostable materials that are food safe, properly labeled, and economically feasible.** The IEO sector requires food-safe compostable packaging materials (meeting the same demands as recyclable packaging described below) that are certified and labeled according to relevant standards (for example, EU standard (EN 13432)), and that are economically feasible compared to other non-compostable materials. The quality of compostable materials determines whether the packaging is durable enough to ensure food safety.[13] Food-safe compostable material innovations are increasing, but only innovation at scale can move the needle here. In addition, the use of compostable plastic is currently restricted by the Single Use Plastic Directive, where all plastics are treated equally. This means that IEOs can often not use compostable plastic packaging (for example, for straws or cutlery) and that there is lower economic incentive for them to invest in compostable polymers.

[13] All compostable packaging that has direct food contact must comply with the requirements of the (EC) No 1935/2004 regulation of the European Parliament and of the Council.

A note on compostable packaging

The term "compostable" is often confused with "biodegradable" and "bio-based." This can lead to miscommunication and incorrect (albeit well intentioned) treatment of the materials.

Biodegradable packaging can be broken down into carbon dioxide, water, and biomass for an unspecified period of time and in unspecified conditions (for example, in a landfill).

Compostable packaging is also broken down into carbon dioxide, water, and biomass but under specific conditions, within a specific time frame. Valuable outputs, such as compost and biogas, are created in the separate waste loop, either in a municipality waste stream or in a privately managed loop (for example, through a partnership between IEO players and waste management companies). This means that compostable packaging can help close the waste loop. In addition, compostable packaging can be especially relevant for the foodservice sector, where food contamination is a critical challenge for recycling. Implementing compostable packaging allows consumers to place food scraps and the packaging in the same waste stream. Compostable packaging is subject to European certification standards, in contrast to biodegradable.

For these reasons, we believe that compostable packaging has a potential role to play in circular models for the IEO sector.

Sources: Ellen McArthur foundation, Europe Compost Network; Kearney analysis

— **In-store and public sorting infrastructure.** In conjunction with the public sector, the IEO sector needs to invest in additional sorting stations that separate compostable packaging (for example, food scraps, compostable packaging such as paper and cardboard) from non-compostable packaging waste.[14] To enable compostable waste to be used as a source of high-quality fertilizer and soil improver, it needs to be collected separately at source, while ensuring no contamination from non-compostable materials. More specifically, to create a high-quality, nutrient-rich quality of compost that does not pollute the soil, any material that contains potentially harmful additives and microplastics should be avoided and not mixed with compostable packaging waste. If compostable packaging is placed in a general waste stream (for example, with other plastics), the recyclability of that batch will be lower. The reverse is also true: if non-compostable packaging is placed in a compostable waste stream, both the quality of the compost and its value would be affected and result in a negative environmental impact.[15] Because the level of separate bio-waste collection differs considerably across Europe today, the adoption of compostable materials depends on having the infrastructure to enable the effective separation, sorting, and disposal of waste.

— **Industrial composting infrastructure.** Compostable packaging needs to be disposed of through industrial composting processes. Currently, many plastics labeled as compostable or biodegradable are designed to decompose under controlled conditions in industrial bio-waste treatment plants, but do not fully decompose in anaerobic digestion plants, soil, or in home composting. Data on treatment capacity is limited, but, according to ECN, Europe has the capacity to treat 31 million tons of compostable waste, across 3,403 industrial composting facilities. Capacity per European country varies from 365 kg bio-waste per person to close to zero. While many European countries have the capacity to treat the bio-waste they generate (for example, Austria, France, Netherlands, Sweden, Slovenia, and the UK) others need to expand capacity to treat growing volumes (for example, Belgium, Italy, Spain, Portugal, and Latvia). In addition, others also need to expand capacity to treat current volumes (for example, Estonia, Greece, and Turkey). It is also vital to set up the right infrastructure to manage compostable packaging. The UK, for example, has invested heavily in anaerobic digestion plants to process food waste, but the industrial composting infrastructure cannot yet process compostable packaging at scale, according to the Ellen MacArthur Foundation.

— **Governmental policies to incentivize reduce/replace.** EU countries have, to varying extents, implemented policies to incentivize and steer players to produce fewer packaging materials. This includes the EU Single Use Plastics Directive, which aims to reduce the amount of plastic waste in the environment through an EU-wide ban on specific single-use plastic products, such as plates, straws, and cutlery. It is key that European policies are designed to incentivize players to reduce waste in the most effective ways: for example, ensuring that national-level legislation follows European legislation by focusing on cross-country harmonization and consistency. It is also crucial that a cross-European policy framework is developed for sourcing, labeling, and use of compostable packaging to ensure cross-European harmonization.

Consumer challenges and opportunities

— **Consumer awareness and behavior.** Research spanning 1,500 European consumers in the UK, Germany, Italy, France, and Sweden indicates that consumers are generally receptive to biodegradable and compostable packaging. It also indicates that "compostability" has the highest level of positive consumer response among "made of recycled materials," "eco-friendly," and "less plastic," with nearly half of European consumers within the countries covered in the report stating they would be willing to purchase a product made of compostable packaging. However, consumer education is still lacking. Only one in three European consumers correctly recognizes the logo for a product that is compostable and are generally unaware that most compostable packaging still requires specific conditions to appropriately decompose (for example, it cannot simply be "thrown away" wherever they choose). In addition, it is key that consumers place the compostable packaging in the compostable waste stream as described above, with the help of easy-to-understand, harmonized labels and education initiatives. Consumers should also avoid placing any non-compostable waste in these bins to avoid contamination.

[14] Many non-chemically treated paper and cartons are compostable. Many paper and carton packaging have additives which can be composted but could be harmful for soil.
[15] The composting process by itself is not affected by non-compostable packaging waste (the composting process can continue), however the quality of compost that is derived from the industrial composting process is of lower quality.

Environmental challenges and opportunities

— **Littered packaging due to poor and confusing consumer education.** If consumers continue to misunderstand how "compostable" materials need to be managed, there is an environmental risk of littered compostable packaging in cities or in nature. The EEA states that the proliferation of different labels and claims relating to compostable and biodegradable packaging might confuse people, and risk people misinterpreting such labels as a "license to litter."

— **Impact on non-organic waste stream recyclability.** Inadequately designed infrastructure will prevent consumers from properly sorting organic vs. non-organic waste, adversely affecting the recyclability and compostability results of the two different solutions. For instance, compostable packaging that ends up in a landfill may lead to an increase in GHG emissions, so it needs to be carefully controlled and processed to avoid creating a negative environmental impact.

— **Compostable items are single use.** Disposable compostable packaging needs to be manufactured from scratch each time, since the end product—compost—cannot be used to produce new items. This end-to-end manufacturing process is driving GHG emissions and the use of new resources. Even though compostable packaging is still a single-use solution, it could provide environmental benefits when implemented correctly. Under the new PPWR proposal, compostable packaging is considered a circular solution as it generates value-added materials (for example, compost, biogas) that can be repurposed in the economy.

Compostable packaging can help close the waste loop.

Reduce/replace: summary

Key challenges. Scaling composting solutions for the IEO sector will require investing in and building the correct composting infrastructure. This will enable greater control and acceptance of foodservice compostable packaging, raise consumer awareness, and encourage consumers to sort compostable packaging correctly. Accountability is also needed for each stakeholder across the value chain to make sure compostable packaging reaches industrial composting facilities and leads to positive environmental impacts. EU policies must facilitate the creation of a market for nutrient-rich compost that will eventually drive higher acceptance rates of compostable packaging at industrial composting facilities.

Key opportunities. Compostable packaging presents a valuable opportunity for the IEO sector to tackle some of the main challenges in takeaway consumption models, particularly low acceptance of multi-material packaging and food contamination at recycling facilities.

Circularity option #2: reuse

There are two main reuse models for food consumption in the IEO sector. Under the first, the consumer uses packaging that belongs to the IEO player: this reuse model can be managed end to end by the IEO player or by a third-party provider that cleans, dries, and returns the packaging to the IEO player's premises. Under the second model, the consumer "brings their own" packaging. While each model has unique characteristics, they also share some challenges and opportunities.

Economic challenges and opportunities

— **Higher cost of food-grade standard reusable packaging.** Reusable packaging costs significantly more than disposable packaging. It requires the use of food-grade standard packaging materials such as polypropylene (PP) to ensure the packaging is robust enough to be washed, dried, and reused multiple times without losing its integrity (for example, without scratching or breaking). While other types of plastics can be used, they may often not be sturdy enough to be used enough times to generate the environmental benefits of reusing packaging. This often means that the (plastic) material use is higher than in other circularity models. For example, a multi-use 16 oz Starbucks coffee cup with lid can contain 9x more plastic than a single-use paper coffee cup with a plastic liner and plastic lid. In addition, to ensure food safety in the long term, it is key that the material transfers no chemicals (for example, from the color coatings) and can be cleaned well enough to eliminate the risk of microbiological growth and accumulation if the packaging is scratched.

— **In-store and public infrastructure (when the IEO owns the packaging).** For in-store consumption, reuse models require a complex reverse logistics infrastructure, starting with a collection system and potentially including a deposit scheme to collect the dirty packaging after consumption. After collection, the reusable packaging will need to be washed, dried, and stored in ways that ensure compliance with food safety and operational requirements. To prevent dirty packaging from entering the food preparation area, washing reusable packaging for dine-in requires separate spaces and flows for the used/dirty packaging, the washing/drying process, and the clean packaging waiting to be used again. It can also involve additional labor, particularly as the volume of reusable packaging increases.

In addition, introducing reusable packaging in-store could reduce the speed of service, driven by the increased operational complexity that comes with having and offering both disposable and reusable packaging. This will typically require IEO stores to be remodeled to allow for washing equipment and space, requiring significant capital investment. Since many IEO stores are not large enough to fit the necessary washing infrastructure, or lack the capital to invest in it, they will need to have both third-party logistics and off-site washing facilities. Off-site washing would require both significant investment and a logistics network capable of efficiently transporting reusable packaging to and from restaurant sites.

— **Takeaway consumption increases complexity.** Assuming packaging is in a condition to be accepted by the washing facilities (for example, not scratched or broken), additional reverse logistics capabilities are required to restore back dirty packaging once used, as the volume of packaging washed at off-site washing facilities will be larger than for dine-in consumption. Most importantly, there is minimal to zero visibility into consumer behavior when it comes to takeaway consumption, so IEOs are also likely to incur additional replenishment costs to replace packaging that might represent a food safety risk.

— **Added energy and labor costs from managing reusables.** Reusable packaging will also likely raise operating costs for IEOs, driven by increased energy costs from the washing facilities and the extra labor needed to operate and manage the packaging (collection, cleaning, washing, and so on).

— **Potential lawsuits arising from food-borne diseases/allergic reactions.** The responsibility for food safety also becomes complicated in reuse models, especially for bring-your-own systems. If a consumer becomes sick after consuming a meal from packaging that is theirs, but food that is from the IEO player, it is not fully clear where the responsibility lies. In addition, when IEO players own the reusable packaging, they need to ensure that the dirty items are washed effectively. Early McDonald's pilots suggest that if dirty reusables are returned unwashed after a number of days, additional automated washing cycles or methods, such as manual scrubbing, are needed to clean them, or they may need to be eliminated altogether due to the food safety risk.

— **Governmental policies to incentivize reuse.** Governmental policies must be designed to incentivize and support players in implementing effective reuse models. Many European countries acknowledge that reuse models should be an integral part of waste reduction strategies, but policy on reuse is still immature and untested for many governments.

Consumer challenges and opportunities

— **Consumer adoption.** Any reuse model will require extensive consumer education to ensure adoption—particularly to give consumers comfort in reusing packaging that has been used by others. Food contamination and allergy risk are both top of mind for consumers.

— **Consumer return rates.** For reuse models to work and achieve environmental or financial break-even (for example, compared to single-use plastics), consumer behavior must enable high return rates. Estimates suggest that a reusable cup needs to be reused between 50 and 100 times to make it environmentally preferable to a single-use cup from a plastic waste generation point of view. In pilot tests conducted across some countries in the European IEO sector, the return rates of reusable packaging turned out to be low—either because returning the packaging was inconvenient for customers or because they lacked understanding of how reuse systems work across both dine-in and takeaway consumption formats.

— **Food safety risks.** Despite improved washing infrastructure, reusables packaging can still transfer bacteria and allergens to consumers. This is particular risky for takeaway consumption, where consumers take the packaging with them and can then use it for any application, even if it is not food related. IEO players therefore face significant risks when packaging leaves and re-enters their stores.

Environmental challenges and opportunities

— **Limitations of sustainable sourcing of reusable packaging materials.** Larger IEO players have already made public commitments to sustainably source their disposable packaging portfolios. For example, KFC sources all its fiber packaging from certified or recycled sources, while McDonald's and Burger King have committed to using 100 percent renewable, recycled, or certified packaging by 2025. A shift to a reusable packaging portfolio—likely plastic-based—will significantly increase the demand for certain plastic materials. However, the market availability of sustainably sourced reusable materials might be limited—at least in a transition period when demand for sustainably sourced reusable packaging materials increases faster than supply.

— **Added stress on water and energy systems from washing requirements.** Reuse models can have a negative environmental impact by increasing the energy and water consumption required for the washing process. EPPA and Ramboll estimate that water consumption for a reusable system with 100 reuses is 267 percent higher compared to a paper single-usage model. In addition, the reverse logistics from consumers to the washing facilities (in the IEO store or for takeaway consumption) requires additional transportation, often driving additional GHG emissions in the value chain. As a result, reuse models bring an environmental risk of added stress to European water and energy systems, which are already under pressure in many markets. This is particularly relevant in Europe, where demand for water usage is steadily increasing (on average a European consumer requires 100 to 200 liters per day), while inflationary market pressures pushed up gas prices by 430 percent and electricity prices by 230 percent between September 2019 and 2021 (a trend further accentuated in 2022). It is therefore crucial to consider the full life cycle of reusable packaging—making reasonable assumptions on consumer behavior, use cycles, resource requirements from operating reusables, and macroeconomic conditions in order to fully understand its environmental impact not only on waste systems, but also on water and energy.

Reuse: summary

Key challenges. The key challenge in scaling reuse for the European IEO sector is in takeaway consumption. This is driven by the required changes in the current packaging mix (shifting to a significant amount of plastics), the additional required infrastructure, and the added operational complexity (both on-site and off-site, including the need for reverse logistics, washing, and drying). All these factors can create a negative environmental impact in the form of water/energy system stress and GHG emissions. In addition, lack of visibility into consumer behavior can also drive low return rates—raising potential food-safety concerns for the sector.

Key opportunities. The key opportunity in scaling reuse for the European IEO sector lies in further exploring the potential to incorporate reusable packaging for dine-in consumption across select packaging items. While further testing and learning is required at scale to prove out the economic, environmental, and consumer outcomes (as explored in greater detail in **chapter 3**), the controlled environment of dine-in consumption versus takeaway could create an opportunity to introduce reuse for specific dine-in packaging items.

— **Low return rates for reusable packaging.** Successful implementation of reusable packaging depends on high return rates. Low return rates require IEO players to have larger volumes of reusable packaging available. This is likely to translate into a negative environmental impact due to the higher GHG emissions generated by the additional manufacturing involved in producing more reusable packaging, and the transportation required to move it around.

— **Replacing paper with thick plastic.** A shift to reusables in the IEO sector will likely imply a shift from disposable paper to thick reusable plastic. Unless high reuse rates are achieved, reuse models will lead to a sharp increase in plastic materials in Europe.

— **End-of-life disposal.** Once packaging can no longer be safely reused, it needs to be disposed of sustainably—preferably through recycling. Materials used for reusable plastic packaging can include PP or HDPE (high-density polypropylene)—both of which are typically recyclable—but waste flows and recycling facilities must be capable of properly managing the reusables at end of life (see challenges and requirements for recycling below). Eurostat data estimates that the European recycling rate, across sectors, has risen from 2019 about 40 percent for plastic packaging compared to about 80 percent for paper packaging. This indicates that while plastic reusables account for fewer items in total compared to paper single-use packaging, they will be challenging to recycle without greater development of recycling systems.

The key challenge in scaling reuse for the European IEO sector is in takeaway consumption.

Circularity option #3: recycle

Economic challenges and opportunities

— **Rules on collection of commercial waste.** The waste collected in dining areas of IEO stores, such as packaging, is often considered "commercial waste," rather than household waste. Because commercial waste is often managed by public parties, IEOs have limited to no influence over how the waste is treated and instead need to comply with municipal requirements. Where permitted, companies can organize a separate waste system at extra cost, creating opportunities for better control over collection, sorting, and recycling of waste generated in-store. This reduces food contamination and drives higher recycling rates. Such an approach has been implemented by McDonald's in Poland, where it partnered with an external recycling facility to open a dedicated recycling waste stream for McDonald's stores. This enabled it to recycle fiber-based waste that otherwise would have been eliminated or recycled to a lesser degree.

— **Sorting infrastructure for IEO stores.** Stores need recycling stations with an adequate, easy-to-understand sorting system to enable good sorting at source. This includes keeping waste streams separate to avoid any cross-contamination.

— **Sorting infrastructure in public spaces and households.** Given the high market share of takeaway consumption, public spaces and household waste systems also need to provide adequate recycling infrastructure. They can tackle this by installing bins that clearly and easily allow consumers to place their waste in the right bins to allow for better sorting.

— **Logistics, sorting, collection, and end-of-life infrastructure.** Reverse logistics, MRFs, and recycling facilities that accept foodservice packaging waste are also required. Transportation of the waste from the sorting stations to the MRFs and recycling facilities (by waste management companies or the municipality) needs to be properly managed to prevent cross-contamination across materials. In addition, MRFs must be able to sort the foodservice packaging and the recyclers must be able to recycle it efficiently through solutions/technologies to handle food contamination and mixed materials, such as using high-temperature industrial facilities or setting up a separate process for foodservice packaging items such as cups. The modifications and added efforts required to recycle foodservice packaging compared to "clean" packaging vary by type of packaging and facility. For example, most standard mills in Italy can recycle foodservice packaging in their standard processes, whereas "special" mills or a separate process is required in other countries, such as the UK, where only four recycling facilities can recycle foodservice cups. These are standard paper mills, but have a different process for the cup waste stream compared to other paper products.

— **End-market demand drives acceptance levels of foodservice packaging waste.** Recyclers' willingness to recycle the foodservice packaging material is dependent on market demand for the output material. Without market demand (and domestic recycling/reprocessing capacity), the material collected by the MRFs will not be bought by manufacturers and will not be recycled into another product. For example, paper packaging sorted at source that is kept clean typically represents an attractive business opportunity for a recycler. Conversely, dirty and greasy paper separated from a mixed material waste stream that needs to be separated by a consumer and/or MRF might not be worth recycling. In addition, foodservice packaging waste—such as clamshells, cups, and lids—is relatively low volume compared to other types of waste, meaning that it is often not worth the effort for recyclers—nor the sorting costs and bunker space at MRFs.

— **Governmental policies to incentivize recycling.** Various public approaches are put in place to incentivize companies to act in a more circular manner, such as through recycling. Extended producer responsibility (EPR) schemes are designed to ensure that the companies that put packaging on the market pay for it to be collected, sorted, and recycled after use. In addition to providing funding, the scheme incentivizes producers and players to put less packaging on the market. Although EPRs are seen as an effective funding mechanism, including by the Ellen MacArthur Foundation, schemes must be well designed and well implemented. Challenges and risks for EPRs include the lack of standardization and undefined roles and responsibilities. These are often dependent on the maturity of players across the value chain and the existing waste management infrastructure, which can lead to issues including:

  — Significant variations in how EPRs operate

  — Slow decision-making, and "loopholes" in the system

  — Low levels of transparency (for example, minimal visibility into the economics of the scheme, difficulty to track and monitor outcomes)

  — Low enforceability mechanisms (for example, potentially leading to some players "freeriding," or not contributing their share to the scheme)

The significant variations in EPR schemes across European countries are also a key challenge for international IEOs, limiting the opportunities for players to develop a standardized approach to monitoring and controlling the scheme. Other financial policies designed to incentivize improved recycling (or reduced waste overall) include gate/tipping fees, landfill taxes, and waste fees. Policies play a vital role in incentivizing players to become increasingly circular, but it is key that they are well designed, for example, through cross-European standardization.

Consumer challenges and opportunities

— **Changing consumer behavior through incentives and consumer education.** While MRFs can be used to separate waste into individual recyclable waste streams, sorting at source (in other words, by consumers) improves recyclability in two key ways: first, it efficiently puts the waste in the right stream from the start; and second, it reduces contamination and leakage. To improve sorting at source, consumers need to be educated and incentivized—preferably through a standardized system that works across public spaces, households, businesses, and restaurants (as seen in the German recycling model). Consumer education can be delivered through marketing campaigns, easy-to-understand signage and color coding, and providing additional staff/workforce in stores or high-traffic public spaces to help customers to sort their waste correctly.

  Education can also be coupled with incentives, as demonstrated by Café Nero in Sweden and Bagelstein in France and Sweden. These chains are partnering with the recycling deposit system provider &Repeat to give consumers credits when they return their used packaging for recycling. There are also nationwide deposit systems, such as the Swedish "Pant," where consumers get a SEK1 to 3 deposit (equivalent to 10 to 30 eurocents) back when returning their aluminum cans and PET plastic bottles. This scheme has been in place since the 1980s and has since been augmented by extensive campaigns, delivering a return rate of around 88 percent. Other initiatives designed to change consumer recycling behaviors include the industry collaboration "National Cup Recycling" scheme in the UK, where eight influential IEO brands are co-funding a recycling system and consumer education campaign for cups. Despite this campaign, only 6 percent of the cups covered by the scheme (in other words, those sold through partner retailers across the UK) were recycled, according to PCRRG. This illustrates the extent of the challenge involved in changing consumer behavior: investing in extensive consumer education and securing the support of influential brands is vital, but increasing the amount of collection and sorting locations will also have a significant impact.

Environmental challenges and opportunities

— **The environmental impact of the recycling process.** Recycling packaging requires transportation, sorting, cleaning, and processing—all of which need energy and may create by-products that can pollute the soil, air, or water. Using recycled materials instead of virgin materials reduces CO_2 emissions by 40 to 70 percent, but the end-to-end recycling process still creates an environmental impact.

— **Limited number of recycling loops.** Plastic polymers or paper fibers are weakened every time they go through a recycling loop. Plastic materials can only be recycled two to three times before the quality becomes too poor to use and requires modifications to strengthen it—with the energy consumed to achieve this outweighing the benefits. Meanwhile, paper fibers will become too short to use after five to seven recycling loops. This means that materials used in the IEO sector cannot—unlike glass—be recycled infinitely.

Using recycled materials instead of virgin materials reduces CO_2 emissions by 40 to 70 percent.

Recycle: summary

Key challenges. The key challenge in scaling recycling solutions for the European IEO sector lies in the lack of available collection and sorting infrastructure and market demand from collectors and recyclers to accept existing packaging waste from IEO players. In addition, overall recycling rates are reduced by the longer and more technical process involved in recycling food-contaminated packaging items. Rates are also adversely affected by the use of mixed materials, although efforts are under way in the sector to address this by further replacing plastics with fiber-based materials.

Key opportunities. There are two key opportunities in scaling recycling solutions for the European IEO sector. The first is to optimize the existing recycling infrastructure across the value chain (in contrast to reduce/replace and reuse, which would both require greater infrastructure investments and foundational development), starting with improved collection and sorting technologies such as watermarking to improve overall recycling rates. As discussed above, the second opportunity is to facilitate cross value chain collaboration and accountability with the goal of boosting end-market demand for IEO sector waste (providing the right incentives to MRFs and waste management companies).

Chapter 3: No single circularity solution will be enough: only a mix of solutions will deliver the best economic, environmental, and consumer outcomes for Europe

Kearney's data-driven evaluation of different circularity solutions demonstrates that the best economic, environmental, and consumer outcomes for Europe are always achieved through a mix of circularity solutions, not via single circularity solutions.

Kearney evaluated the projected impact of PPWR (specifically mandatory reuse targets) across economic, environmental, and consumer dimensions. PPWR is designed to strengthen the sustainability of packaging and reduce packaging waste, partly through mandatory reuse targets. In this study, we quantify the impact of mandatory reuse targets on the IEO sector by 2030, comparing it to an estimated 2030 baseline (see figure 6 on page 25). The 2030 baseline represents an estimate of total waste in the IEO sector, calculated by extrapolating 2021 waste data and assuming no changes in innovations, resources, or waste management techniques by 2030.

Projected environmental impact of PPWR targets

We assess the environmental impact based on three key metrics: total packaging waste generated, total plastic packaging waste generated, and the GHG emissions emitted across the value chain. The primary contributor to the overall environmental impact is the "return rate"—defined as the amount of reusable packaging returned by consumers to be washed, dried, and reused once again.

Higher return rates can lead to better environmental outcomes as the packaging items are used enough times before end of life to make them environmentally feasible—unlike single-use packaging. In the context of reuse, return rates are dependent on the consumption channels (dine-in and takeaway) as consumer behavior and visibility differ significantly between these. This study assumes optimistic return rate estimations of 70 percent (three uses in the IEO sector based on preliminary McDonald's pilot data across select markets) for takeaway consumption, and 95 percent (20 uses in the IEO sector based on preliminary McDonald's pilot data across select markets) for dine-in. And for single-use packaging (such as in solutions with recycling, composting, and reducing), return rates are assumed to be equal to one, as consumers dispose of the dirty packaging after use. Further data is required to understand whether these reuse return rates are possible in practice, and any variations that may exist across markets (for example, higher or lower return rates than the ones used in this study).

Figure 6

The environmental impact of mandatory reuse targets on the IEO sector varies greatly between dine-in and takeaway

IEO sector 2030

Note: These results were achieved by making several assumptions including but not limited to a 2030 baseline extrapolation of waste in the IEO sector based on 2021 data, a calculation of recycling, reuse, composting rates based on 2021 levels, a reusable packaging return rate of 70 percent for takeaway and 95 percent for dine-in, an assumption that the only plastic used for reuse is polypropylene (PP). GHG figures estimate the avoided emissions across the value chain.

Sources: Simapro data base, EPA waste reduction model; Kearney analysis

For **dine-in consumption**, we estimate that while total packaging waste (all packaging types, but primarily fiber-based) could be reduced by up to 50 percent, the total plastic packaging waste would increase by up to 300 percent. GHG emissions will also rise, driven by the manufacturing of the packaging material (primarily plastics) and the energy required to wash and dry reusable packaging. In addition, reuse models would require 1 to 4 billion liters of additional water consumption (depending on reuse targets).

When it comes to the high—and growing—share of **takeaway consumption**, the environmental impact of reuse appears even less attractive. Total packaging waste (measured by weight) is estimated to be in line with—or slightly higher than—the 2030 baseline (for example, reusable packaging is heavier vs. single-use packaging), and plastic packaging waste will sharply increase by more than 1,500 percent. In addition, GHG emissions will increase by up to 260 percent. These results are primarily driven by the existing lack of reuse infrastructure and the limited influence of IEO players on consumer behavior in takeaway (leading to projected lower return rates of reusable packaging versus dine-in consumption), combined with the resource-intensive manufacturing and operations required by reusable packaging.

Added operating costs of managing reuse ranges from €1 billion for limited reuse/ dine-in only, to €15 to 20 billion for full reuse.

Projected economic impact of PPWR targets

We estimate the investment required to achieve reuse ranges from €2 billion (enabling reuse for some items for dine-in consumption only) to €15 to 20 billion (for reuse across all items and for both dine-in and takeaway consumption). This is primarily driven by the need to establish the appropriate reuse ecosystem including washing infrastructure (in-store and through third-party providers), collection points, and reverse logistics. As a point of reference, the EU's investment framework for the cohesion policy supporting the circular economy invested €4.3 billion in improved waste management between 2014 and 2020.

The added operating costs of managing reuse (increased labor, water, and energy costs, as well as the cost of sourcing reuse materials) ranges from €1 billion for limited reuse for dine-in only, to €15 to 20 billion for full reuse across items and channels. This cost could potentially be even higher, due to the increased operational complexity discussed in **chapter 2**. This added operating cost translates to 0.5 to 7 percent of the sector's projected revenues in 2030. By way of comparison, Upserve estimates that the average profit margin for a fast-food restaurant is around 6 to 9 percent. Although some cost might be transferred to the consumer, it is important to consider that affordability and value for money are two key characteristics of the IEO sector. The extent to which the added operating cost can be transferred to prices will be crucial, especially for small business owners. This extra cost could represent a significant upfront investment for IEO players—representing a big financial impact in the short term. What's more, if players were given only a short period of time to implement new solutions, they would miss out on the positive financial gains that would come from having the time to test, learn, and optimize solutions, as well as the opportunity to share lessons learned before scaling solutions more broadly.

Projected customer impact of PPWR targets

Finally, it is important to consider the practical implications of reuse models for consumers. Consumer behavior is crucial to making reuse models work for the IEO sector—especially in the hard-to-influence takeaway channel. To enable the high return rates required, consumers that are already struggling with putting the takeaway packaging in a general waste bin—let alone in the right recycling bin with proper sorting of food scraps and packaging materials—would be expected to bring back the used packaging to a deposit station.

Consumers would also be expected to treat the packaging in ways that do not jeopardize its robustness and food safety (such as scratching it) so that the packaging does not need to be disposed of before going through the necessary number of loops to make reuse models feasible. In addition, consumer convenience and affordability—both key characteristics of consumer expectations in the IEO sector—will be significantly affected by reuse models. The high proportion of takeaway consumption in the IEO sector, and the parallel rise in meal delivery services directly to consumers' homes, are likely to hinder the adoption of reuse models. Consumers would need the right infrastructure and incentives in place to appropriately return the reusable packaging as it would be inconvenient for them to return it after consuming the food at home.

The quantification of potential mandatory reuse targets highlights the high cost of a reuse "blanket" approach—for the environment, businesses, and consumers alike. We believe that while reuse should play a role in Europe's circularity strategy across some sectors, it is crucial to explore the full range of circularity solutions and tools available in Europe before fully scaling mandatory reuse solutions. To do so, we considered the mix of circularity solutions that can generate the greatest economic, environmental, and consumer benefits in the European IEO sector.

To establish this, we developed and modeled six scenarios to represent the broad range of circularity solutions available for dine-in and for takeaway consumption (see figure 7 on page 28). All scenarios shown below represent 2030 future-state potential and are deemed achievable with the right legislation, infrastructure, and packaging design in place. A full-scale rollout of scenarios would require a trial period to improve and iterate on solutions and ensure feasibility at scale. Specifically, this study assumes (and incorporates the necessary investment assumptions in) the following innovations by 2030 across key circularity solutions. Additional innovations would further increase the environmental and economic benefit of the solutions outlined below.

Reduce/replace. This study assumes the required innovations in packaging design (for example, the ability to have fully compostable packaging, even for multi-material packaging items such as cups) and infrastructure requirements (for example, industrial composting facilities and adequate collection and sorting infrastructure) would be in place to scale compostable paper packaging solutions.

Reuse. This study assumes reuse collection, washing/drying, and transportation at scale both on and off site, and the availability of robust plastic packaging required for reuse models to work.

Recycle. This study assumes:

— Recycling innovation in collection and sorting techniques aided by the use of technology such as digital watermarking

— An increase in the acceptance of recyclable waste by MRFs

— Improved recycling rates even for food-contaminated packaging

Packaging material used in 2030 for recycling is assumed to be similar to baseline, as the packaging portfolio is already largely composed of fiber materials. While there is opportunity to change the packaging material and further increase recycling rates, this study finds that improved collection and sorting, through a variety of levers across the value chain, demonstrated higher potential to increase recycling rates.

The scenarios we have modeled range from an exclusive focus on a single solution (reuse, recycle, or replace to compostable) to a combination of solutions across different packaging items. Where a mix of solutions is explored, this study considered the best outcome on an item-by-item basis. For example, beverage cup items are a promising candidate for reuse in dine-in given a greater control over consumer behavior (with the aim of addressing recycling challenges driven by mixed materials and food contamination). In addition, "bring your own cup" reuse models for cups have been more tested and explored, by, for example, coffee shops, compared to other packaging items. Using a similar logic, paper wraps and napkins are typically too contaminated by food or of too low value to recycle and will likely be challenging to turn into reusable packaging, making them a promising candidate for compostable solutions.

Figure 7

There is a broad range of circularity solutions available for dine-in and for takeaway consumption

	Scenario 1: **All reuse**	Scenario 2: **Improved recycling**	Scenario 3: **Reuse cups and improved recycling**	Scenario 4: **Reuse cups, compost napkins/ wraps, improved recycling**	Scenario 5: **Reuse cups and compost rest**	Scenario 6: **All compost**
Cups	Reused	Recycled	Reused	Reused	Reused	Compostable
Plastic bottles	Reused	Recycled	Recycled	Recycled	Compostable	Compostable
Folding carton	Reused	Recycled	Recycled	Recycled	Compostable	Compostable
Pizza box	Reused	Recycled	Recycled	Recycled	Compostable	Compostable
Plastic container	Reused	Recycled	Recycled	Recycled	Compostable	Compostable
Lids	Reused	Recycled	Recycled	Recycled	Compostable	Compostable
Bags	Recycled[1]	Recycled	Recycled	Recycled	Compostable	Compostable
Paper wrap	Reused	n/a	n/a	Compostable	Compostable	Compostable
Napkins	n/a	n/a	n/a	Compostable	Compostable	Compostable
Example requirements to scale	— Fully redesigned packaging portfolio — Rollout of deposit system — Investment in washing facilities	— Investment in improved collection logistics — Innovation in watermarking and recycling with food contamination	— Rollout of deposit system — Investment in washing capabilities — Investment in improved collection logistics — Innovation in watermarking and recycling with food contamination	— Rollout of deposit system — Investment in washing capabilities — Investment in improved collection logistics — Innovation in watermarking and recycling with food contamination — Investment in industrial composting facilities — Investment in separate bio-waste collection	— Investment in industrial composting facilities — Investment in separate bio-waste collection	— Innovation in packaging for cups to avoid bio-plastics (for example, PLA) — Investment in industrial composting facilities — Investment in separate bio-waste collection — Investment in material design and composition to drive cost-effective production at scale

[1] We assume bags cannot be reused.

Source: Kearney analysis

Dine-in: key takeaways

Environmental impact

The most promising environmental impact can be delivered through full recycling (scenario 2), full composting (scenario 6), or a combination of solutions (scenario 4) (see figure 8 on page 30).[16] Opportunities to control and reduce packaging waste generation for dine-in consumption exist across circularity models, to varying extents. By switching to reusable, recyclable, or compostable packaging, IEO players can reduce their dine-in waste volumes by approximately 50 to 77 percent vs. 2030 baseline. This reduction could be achieved by implementing efficient collection and sorting at source, and by investing in foodservice packaging recycling, and/or composting. Education would also be particularly important here as a mix of solutions would require consumers to understand how to dispose of different packaging items across different bins.

While the IEO sector should explore all circularity options for dine-in consumption, including recycling, composting, and reuse for select packaging items in the portfolio, the ability to identify the most promising solutions hinges on understanding the environmental and economic trade-offs discussed below.

Improved recycling (scenario 2) is an attractive and feasible solution that could be achieved with a shorter lead time. Improved recycling presents the best reduction in GHG emissions, and a significant reduction in plastic waste. It is expected to lead to positive environmental outcomes, but it will not drastically reduce packaging waste volumes due to continued challenges with recycling heavily food-contaminated items, as well as imperfect consumer behavior in terms of sorting at source.

We estimate that efficient investment can improve the sector's recycling rates to about 60 to 70 percent (from current rates ranging from less than 10 percent to more than 20 percent). It should also be noted that Europe already has invested heavily in recycling infrastructure, making this scenario reasonable to achieve in the short term. However, additional investment in recycling will still be required to improve recycling rates in the IEO sector, specifically by:

— Adding pre-treatment steps to remove food contamination

— Enabling better sorting through watermarking

— Rolling out packaging innovation to reduce the amount of multi-material used in packaging (for example, switching from plastic to fiber lids and/or removing plastic liners)

Conversely, reusables and compostable packaging require a longer lead time to implement and scale (and equally importantly, to fully validate the economic, environmental, and consumer impact).

[16] Scenario 4 includes reuse for cups, compostable napkins, and wrapping paper, and improved recycling for the rest of the packaging portfolio.

Figure 8

In the dine-in segment, scenarios 2, 4, and 6 offer the best environmental impact

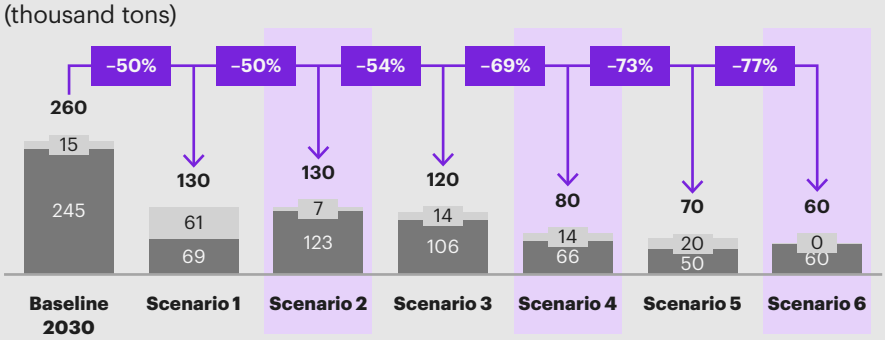
Scenario overview

(1) All reuse
(2) Improved recycling
(3) Reuse cups and improved recycling
(4) Reuse cups, compost napkins/wraps, improved recycling
(5) Reuse cups and compost rest
(6) All compost

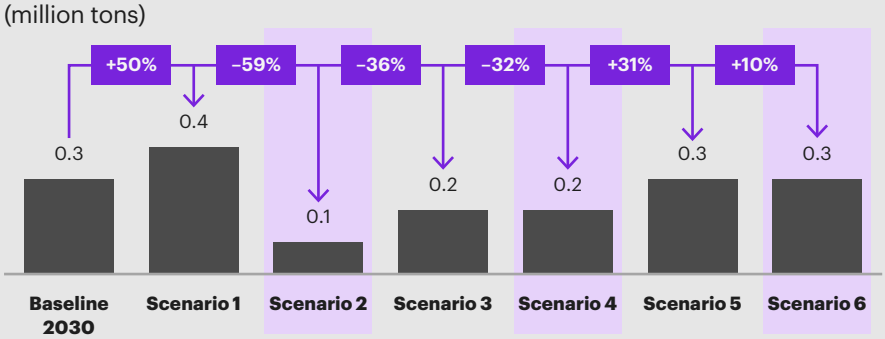
Plastic waste
Paper waste
High-potential scenario

Sources: Simapro data base, EPA waste reduction model; Kearney analysis

Total packaging waste and plastic packaging waste, IEO sector 2030
(thousand tons)



GHG emissions, IEO sector 2030
(million tons)



A fully compostable solution (scenario 6) delivers the best outcome in terms of reduced packaging waste and plastic packaging waste but is not expected to reduce GHG emissions versus the 2030 baseline. This is because manufacturing of compostable packaging needs to be done from scratch, whereas recycling models can skip steps in the manufacturing process and thereby save GHG emissions (as described in **chapter 3**). In addition, we do not see this scenario as feasible in the near future due to the lack of available compostable packaging material at scale, and insufficient municipal collection infrastructure. Making this scenario attractive and feasible would also require a favorable regulatory environment to incentivize innovation and investment in the field of compostable packaging, ensuring the availability of material at scale, and further development of composting infrastructure across European countries.

Implementing reuse for dine-in should be achieved through scenario 4: tackling multi-material packaging with reusables, food contamination with compostable packaging, and implementing recycling innovations. Combining different solutions such as reusing cups, composting packaging items that are challenging to recycle, and improving recycling rates for the rest of the packaging items could lead to a drop in GHG emissions, a significant reduction of around 70 percent in total waste, and a decrease in plastic waste. Specifically, cups combine paper with a plastic liner, which makes them harder to recycle. Implementing reusable packaging for hot and cold beverages (cups) for dine-in consumption would therefore offer a way to circumvent this challenge. To address the challenges in the recycling process (discussed above), compostable packaging could be implemented for packaging with high food contamination, such as napkins, sauce sachets, and wraps.

Economic impact

Required investments linked to scenarios for dine-in consumption vary, primarily driven by the extent of reuse required (see figure 9). It is estimated that a full reuse scenario for dine-in would require investments totaling around €5 billion. This investment would primarily be made by the IEO sector and third-party players, involving major remodeling of stores and the installation of washing infrastructure both on- and off-site.

Capex requirements

Scenarios with no reuse (scenarios 2 and 6) present the lowest required investment. Investment required to improve recycling is estimated at around €500 million, driven by:

— Improved sorting infrastructure

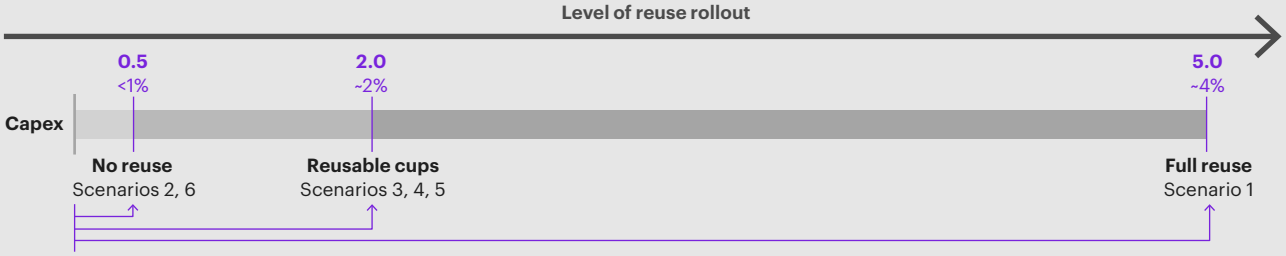
— Enabling better sorting at material recovery facilities through technologies such as watermarking

— Improved recycling technologies and processes for foodservice packaging through pre-treatment—removing food contamination and setting up separate processes for foodservice packaging

We estimated the investment required to enable composting at around €200 million—primarily to enable compostable sorting and expanding industrial composting capacities to effectively compost IEO sector packaging. This also accounts for the cost of switching the packaging portfolio to compostable materials.

Figure 9
The extent of reuse required drives the economic impact of dine-in consumption scenarios

Incremental investments required, € billion, 2030



Capex drivers

No reuse
— Recycle: Investment in high-precision technologies for sorting (for example, watermarking)
— Recycle: Enhanced recycling technologies to manage food contamination
— Compost: Expansion of industrial composting infrastructure

Reusable cups
— Investment in dine-in washing equipment and machinery
— Minor store remodeling to accommodate cup storage

Full reuse
— Investment in dine-in washing equipment and machinery
— Some investment to support takeaway washing due to limited in-store capacity
— Major store remodeling to accommodate revised kitchen operations

Scenario overview: (1) All reuse, (2) Improved recycling, (3) Reuse cups and improved recycling, (4) Reuse cups, compost napkins/wraps, improved recycling, (5) Reuse cups and compost rest, (6) All compost

Source: Kearney analysis

Investments will need to be made by a range of players across the value chain. The investments will focus on dine-in installations of washing infrastructure, sorting stations, and refurbishments to enable the solutions. The exception is investment in recycling facilities: this needs to be made by private or public waste companies and recyclers but will likely require close collaboration with leading IEO players and could include co-investments or incentives—potentially delivered through EPR systems.

Opex requirements

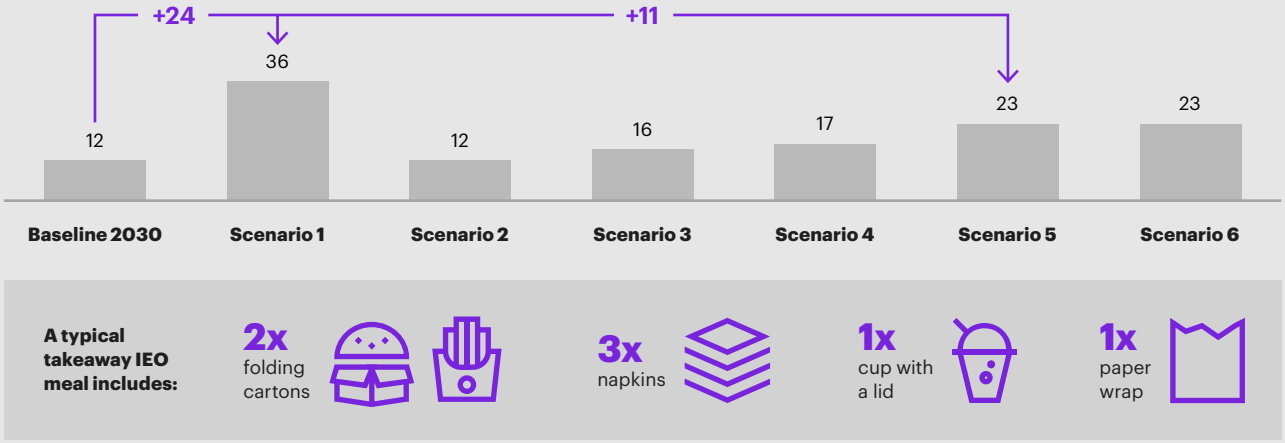
Full recycling (scenario 2) is the only scenario with a lower or similar projected packaging cost per meal (opex) compared to the baseline, followed by mixed solutions (scenarios 3 and 4). Improved recycling is estimated to require some increase in especially labor cost to facilitate improved sorting at source. The materials for recycling models are not estimated to be impacted to enable improved recycling, since the materials used today are—in theory—recyclable and can be recycled with the right recycling setup (covered in investments for recycling scenarios).

Compostable packaging would be more expensive than recyclable packaging. We project that a meal with compostable packaging would be around 11 eurocents more expensive than one with recyclable packaging (see figure 10).

Reuse models are attached to significant increases in operating costs. The added labor, energy, and material cost for reusable would make a meal 24 eurocents more expensive.

Figure 10
Scenario 2 has the lowest opex among dine-in scenarios

Total meal costs, € cents, 2030



Scenario overview: (1) All reuse, (2) Improved recycling, (3) Reuse cups and improved recycling, (4) Reuse cups, compost napkins/wraps, improved recycling, (5) Reuse cups and compost rest, (6) All compost

Note: The costs represented do not represent the price of a meal that will be passed onto the customer. Instead, it shows the value chain operational packaging cost needed for each scenario on a per item basis. It includes the cost of manufacturing, collection/sorting, recycling (and recycling innovations), industrial composting, incineration, and landfill.

Sources: Kearney analysis

Takeaway: key takeaways

Environmental impact

Full compostable (scenario 6) and full recycling (scenario 2) show the greatest reduction in plastic packaging, total waste, and GHG emissions (see figure 11). In line with the results of dine-in scenarios, recycling will lead to lower packaging waste volumes, but will not eliminate waste (due to factors such as food contamination). Compostable packaging can be an attractive solution, especially for heavily food-contaminated items, but will require innovation and infrastructure to realize.

All scenarios with reuse models (scenarios 1, 3, 4, and 5) would lead to increases both in plastic packaging and GHG emissions compared to the baseline. These increases are driven by both the operational requirements of reusable packaging (for example, washing, drying, reverse logistics) and the hard-to-control consumer behaviors (driving lower return rates than required for environmental break-even). Achieving environmental break-even for plastic waste reduction would, under the assumptions in our study, require approximately a 99 percent return rate: we consider this to be unrealistic across both consumption channels, but especially for takeaway.

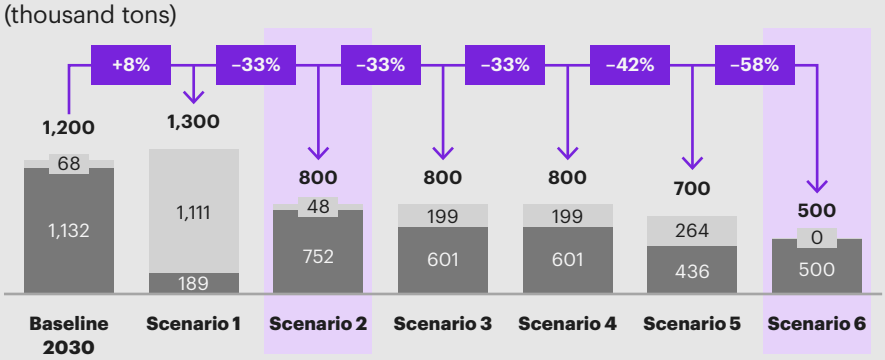
Figure 11
In the takeaway segment, scenarios 2 and 6 have the most environmental impact

Scenario overview
(1) All reuse
(2) Improved recycling
(3) Reuse cups and improved recycling
(4) Reuse cups, compost napkins/wraps, improved recycling
(5) Reuse cups and compost rest
(6) All compost

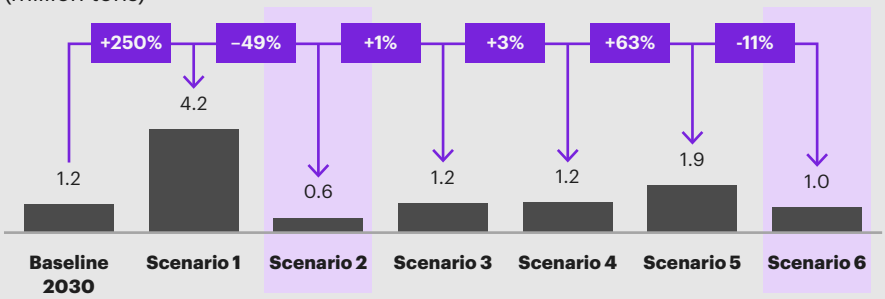
Plastic waste
Paper waste
High-potential scenario

Sources: Simapro data base, EPA waste reduction model; Kearney analysis

Total packaging waste and plastic packaging waste, IEO sector 2030
(thousand tons)



GHG emissions, IEO sector 2030
(million tons)



Reuse for takeaway is not a feasible solution from an environmental perspective. Full reuse (**scenario 1**) highlights this by showcasing an increase in total waste, plastic waste, and higher GHG emissions. Implementing reuse in takeaway, even if across select packaging items such as cups (**scenarios 3 and 4**), leads to a negative environmental impact as plastic waste increases three to four times and GHG emissions are not reduced.

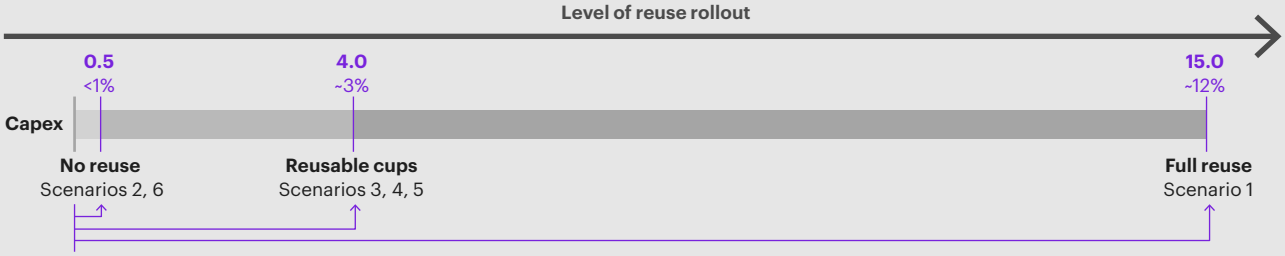
Economic impact

Depending on the scenario, investments required for takeaway are in line with dine-in. However, investments required for reuse would be two to three times greater (see figure 12).

The ecosystem needed to make reuse work for takeaway consumption requires an investment of about €15 billion. A takeaway reuse model requires an ecosystem including deposit stations in public places, reverse logistics, and washing infrastructure (on- or off-site) to handle significantly higher volumes than dine-in reusables. The washing infrastructure also needs to be more advanced to reduce the risk of bacteria and allergens being left in the container. As mentioned, the food safety risk for reusables is higher for takeaway consumption since the IEO players have no visibility into how the consumer uses the packaging before returning it. It is also likely that few smaller stores will have the space or investment capacity required to install washing facilities on-site, meaning that takeaway reuse scenarios will be more dependent on third-party off-site washing. For these reasons, the level of investment required to make reuse work for takeaway is estimated to be up to three times as high as that needed for dine-in reusables.

Figure 12
Investments required for reuse in takeaway would be two to three times greater than in dine-in

Incremental investments required, € billion, 2030



Capex drivers

No reuse
- Recycle: Investment in high-precision technologies for sorting (for example, watermarking)
- Recycle: Enhanced recycling technologies to manage food contamination
- Compost: Expansion of industrial composting infrastructure

Reusable cups
- Investment in third-party dedicated washing facilities
- Investment in logistics network to collect, wash, and redistribute cups
- Minor store remodeling to accommodate cup storage

Full reuse
- High investment in third-party dedicated washing facilities
- Investment in logistics network to collect, wash, and redistribute reusable packaging
- Major store remodeling to accommodate revised kitchen operations

Scenario overview: (1) All reuse, (2) Improved recycling, (3) Reuse cups and improved recycling, (4) Reuse cups, compost napkins/wraps, improved recycling, (5) Reuse cups and compost rest, (6) All compost

Source: Kearney analysis

Investment required for composting and recycling is in line with dine-in. Improved recycling will require better sorting in public places, as well as investments in recycling facilities to better manage the foodservice sector. Investment for improved compostables is fueled by increased sorting in public spaces and expanded capacities in industrial composting facilities across Europe.

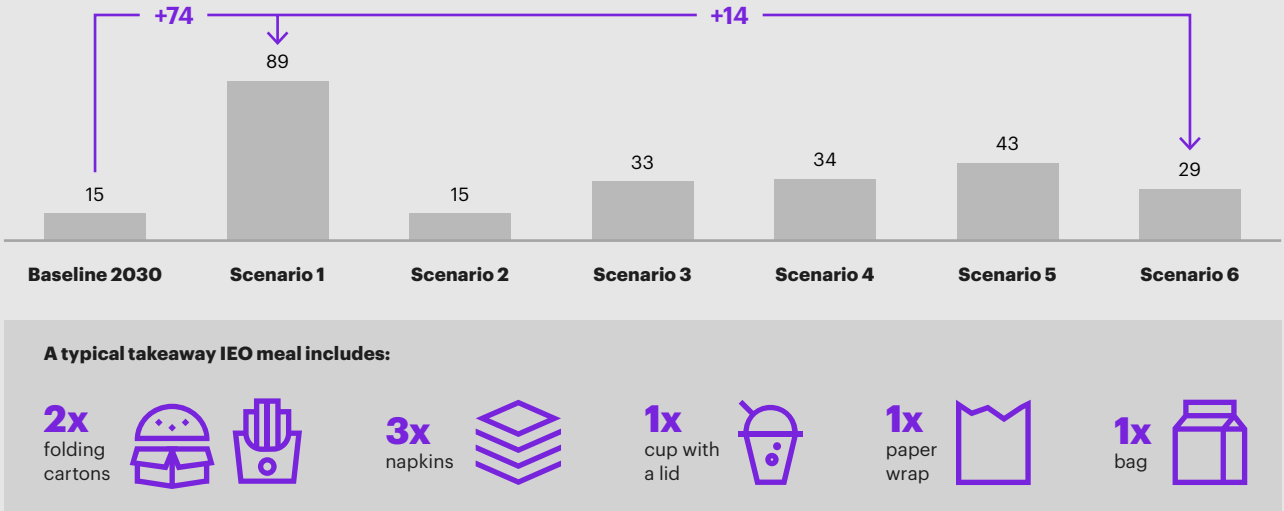
Investment required to enable circular solutions for takeaway consumption is more dependent on broad public–private sector collaboration than dine-in scenarios. Although IEO players will need to invest in dine-in infrastructure (sorting stations, washing infrastructure, and so on) improved collection and reverse logistics for takeaway consumption will, across models, require cross-industry collaborations and/or public investments. This is especially important in enabling independent smaller IEO players (accounting for approximately half of the market) to participate in the circular models. These players will have a greater need than large chains for opt-in systems (without sizeable upfront investment).

Reuse models are linked to significant increases in operating costs (see figure 13). Higher material and washing costs, combined with the added cost of managing the logistics for reusables, will make a takeaway meal around 74 eurocents more expensive to produce. Many of the smaller stores—typically SMEs focusing especially on takeaway—are unlikely to have the space or capital to invest in on-site infrastructure, meaning that they will have to rely on third-party washing. On average, off-site washing is estimated to be 50 percent more expensive for IEO players per reuse compared to on-site washing. This is due to the premium charged by third-party washing facilities, as well as the extra costs of transportation and reverse logistics.

Added costs for compostable and recyclable solutions are in line with those for dine-in scenarios. Compostable packaging is more expensive to produce than recyclable packaging, generating an increase of about 14 eurocents for a typical burger meal. No other operating costs are associated with recyclable and compostable solutions since they are still of a disposable nature and require no added effort in the use phase.

Figure 13
Scenario 2 has the lowest opex among takeaway scenarios

Total meal costs, € cents, 2030



Scenario overview: (1) All reuse, (2) Improved recycling, (3) Reuse cups and improved recycling, (4) Reuse cups, compost napkins/wraps, improved recycling, (5) Reuse cups and compost rest, (6) All compost

Sources: Kearney analysis

Consumer impact (both dine-in and takeaway)

As shown in figure 14 improved recycling is the model that will least impact overall consumer experience, followed by composting, and finally by reuse. Reuse is projected to require the biggest change in consumer experiences compared to today as it is expected to adversely affect affordability, convenience, and potentially food safety.

Figure 14
The recycling model will have the least impact on consumer experience

	Eating experience	Convenience	Affordability	Food quality and safety risk
Replace to compostable disposables Included in scenarios 4, 5, and 6	— No projected change vs. today — Some risk of packaging starting to lose its structure/firmness during consumption — Consumers may perceive compostable packaging as having lower quality	— Sorting post-consumption required, however simple since food scraps and packaging should go in the same bin — Added inconvenience of locating compostable stations	— Cost increase expected to cover more expensive packaging materials	— No projected change vs. today
Reuse models Included in scenarios 1, 3, and 4	— Sturdier packaging can bring an enhanced eating experience — Risk of deteriorated perception of cleanliness impacting the eating experience negatively	— Risk of longer waiting time from slowed-down operations — Added inconvenience of locating returning stations — Need to adopt a new type of model for packaging — Burden of returning reusable packaging	— Significant cost increases expected to cover added labor and energy costs from the washing — Potential deposit schemes also negatively impact perceived affordability	— Increased risk of unwanted bacteria or allergens — Overall risk of deteriorated "cleanliness"
Improved recycling Included in scenarios 2, 3, and 4	— No projected change vs. today	— Improved/more diligent consumer sorting required — Added inconvenience of locating recycling stations	— No projected change vs. today	— No projected change vs. today

↑ Positive impact on consumers → No change/impact on consumers ↓ Negative impact on consumers

Scenario overview: (1) All reuse, (2) Improved recycling, (3) Reuse cups and improved recycling, (4) Reuse cups, compost napkins/wraps, improved recycling, (5) Reuse cups and compost rest, (6) All compost

Source: Kearney analysis

Study recommendations

Based on the results of our study, dine-in and takeaway consumption formats in the European IEO sector must be treated differently, and require a different mix of circularity solutions to achieve a balance of economic, environmental, and consumer outcomes. All recommendations below require operational changes and investments by IEO players themselves, but also by stakeholders across the broader value chain (for example, waste management companies, cities and municipalities, innovators, packaging manufacturers, governments—the roles of each stakeholder are further elaborated in **chapter 5**).

1. Takeaway

This study suggests that **reusable models of consumption should not** be implemented in takeaway consumption formats for the European IEO sector. This assessment is based on:

— The negative environmental impact projected by this study

— The required upfront investment and ongoing operating costs

— The overall impact to the consumer experience

In contrast, both **recycling** and **composting** solutions appear to have high potential—albeit at different scales and likely different time frames.

Improved **recycling** shows the most promising balance of economic, environmental, and consumer behavior outcomes. This study assesses that improved recycling is an attractive and feasible solution that could be achieved in the short term to drive circularity for the European IEO sector—building on the work done to date, the existing packaging portfolio, and the infrastructure available. However, ongoing limitations regarding packaging with multi-material and high food contamination mean that additional solutions are needed. **Composting** is a strong candidate for takeaway packaging as it delivers positive environmental impacts while also providing solutions to some of the limitations faced by recycling. The IEO sector needs additional time, the right infrastructure, and regulatory changes (discussed further in **chapters 4 and 5**) to test the full potential of composting solutions. But in the meantime, the sector should continue to pilot compostable packaging across select items in the portfolio to test, learn, and improve before a broader rollout if the economic, environmental, and consumer business case is demonstrated in the future.

2. Dine-in

This study assesses that **all circularity solutions discussed above will play a role for dine-in consumption**, albeit at different magnitudes. First, the IEO sector should prioritize **recycling** solutions, for the same reasons outlined in the **takeaway section** above. Second, the sector should continue to explore composting for select packaging materials that are highly food contaminated and/or are too low quality to recycle (for example, napkins and paper wrappers).

Finally, there is a clear opportunity to introduce **reusable packaging** across select packaging items, but doing so across the entire packaging portfolio appears prohibitive both from an environmental and economic perspective. When it comes to making reuse work, the key difference between dine-in and takeaway is the control and visibility IEO players have. While further pilots and testing are needed to understand the economic and environmental drivers of reuse for dine-in, reusable packaging presents a potentially attractive opportunity to target packaging items with limited recycling and compostable potential like multi-material packaging such as cups.

Chapter 4: A robust policy framework that ensures legislative harmonization at a European level will enable the sector to scale the right mix of circularity solutions

Policy recommendations

Based on the findings of our study, we recommend that European policymakers take the following actions:

Guiding principle #1: Circularity policies must fully evaluate and balance economic, environmental, and consumer dimensions, and be informed by an extensive, fact-based analysis.

Sector recommendations. Before selecting and scaling any circularity solution, European policymakers must work with member states and stakeholders across the value chain to fully map and understand the economic, environmental, and consumer outcomes of individual solutions. While the assessment included in this study provides a good starting point, policymakers should further investigate economic (for example, conducting further sensitivities on key assumptions), environmental (for example, considering a broader LCA analysis looking beyond packaging waste and GHG emissions), and consumer (for example, conducting additional extensive consumer studies across diverse EU markets) outcomes.

Guiding principle #2: Europe must identify the mix of solutions with the greatest potential to work across specific business sectors, rather than mandating "blanket solutions."

Sector recommendations. The IEO sector requires a combination of circularity solutions spanning reduce/replace, reuse, and recycle options. Policymakers must avoid positioning any single circularity solution—in particular, reuse—as a "silver bullet," and ensure that all solutions play a role in driving greater circularity in the sector. The European IEO sector should prioritize improving recycling solutions for both dine-in and takeaway consumption formats, acknowledging that recycling alone will not be enough and additional solutions are needed. In parallel, driven by the unique characteristics of the IEO sector, the introduction of "blanket" solutions and targets must be avoided. Instead, policymakers must revisit circularity targets outlined in PPWR to ensure they support the mix of circularity solutions that achieves the best balance of economic, environmental, and consumer dimensions in the IEO sector.

Europe must identify the mix of solutions with the greatest potential to work across specific business sectors.

Guiding principle #3: Before introducing and scaling new circularity solutions, policies must prioritize improving existing circularity infrastructure and know-how.

Sector recommendations. First, policymakers should prioritize investments in recycling solutions, which emerge from this study as a key opportunity to increase circularity in the short term. To make this happen, policymakers must prioritize the following actions:

1. **Invest in recycling infrastructure and innovation.** Recycling infrastructure is currently under-optimized. Even where it does exist, the infrastructure is typically geared toward municipal and industrial waste and does not take foodservice waste challenges into consideration. It is also highly fragmented both across and within European countries, with varying infrastructures and systems across regions/municipalities. The sector must invest in the recycling collection (both in-restaurant and off-site) and sorting levers (for example, by scaling digital watermarking technology), at a relatively low investment compared to other solutions. In addition, investments should be channeled into innovations that solve food-contaminated packaging as well as the right incentives to increase the acceptance of multi-material packaging to eventually lead to better and higher recycling rates.

2. **Introduce the right incentives.** Policymakers must introduce the right incentives across the value chain, targeting two specific areas. Firstly, solving the EPR inefficiencies described above, specifically by mandating data visibility of funds and outcomes, and ensuring the allocation of funds is equitable across sectors. Secondly, incentivizing MRFs to accept foodservice waste at recycling facilities through economic incentives.

Guiding principle #4: Rolling out new solutions requires testing, learning, and iterating, and the right level of support across the full value chain.

Sector recommendations. Before mandating specific circularity solutions or targets for the European IEO sector, policymakers must first give IEO players time to test, learn, and iterate. This approach is likely to generate even better economic, environmental, and consumer outcomes in the long run, as the final version of solutions rolled out will incorporate iterations and lessons learned across the value chain. And this will also enable the identification of negative consequences and feasibility challenges early on, allowing time for correction, before scaling solutions broadly.

Guiding principle #5: Robust data collection, measurement, and reporting frameworks are all required to support the scaling of circularity solutions and accurately measure the impact of each.

Sector recommendations. Policymakers must establish a standardized framework for measuring and reporting on circularity solutions to ensure that the overarching objective of reducing packaging waste is achieved. This measurement framework must be based on the mix of circularity solutions and targets appropriate for the IEO sector and informed by data directly from players across the value chain. It is also imperative that policymakers develop the required ecosystem (enabled by technology solutions and legal mandates to ensure accountability) to collect industry data and use it to better inform the rollout of circularity solutions. In addition, a standardized measurement approach is crucial to making the supporting technologies work and to enabling a fact-based dialogue and, beyond progress, the economic, environmental, and consumer impact of each solution should be clear. As an example, there is currently no set of standardized and tested metrics for organizations to track progress on reuse. With a standardized measurement and reporting framework in place, private sector stakeholders will report on standardized, and broadly accepted, key metrics and progress to governments, investors, and civil society partners—leading to greater transparency and the quicker adoption of different circularity solutions.

Guiding principle #6: Consumer engagement, via both incentives and education, is required.

Sector recommendations. European consumers are generally open to the idea of more sustainable packaging models. However, to translate this into concrete action and understanding, the sector needs to implement effective consumer education, easy-to-understand logos, standardized systems, and incentives. End-to-end consumer education will be one of the most critical collaboration areas and overarching objectives of the coalition, as ultimately it is consumer behavior that determines if the packaging becomes litter, waste, or stays in the circular value chain as a future resource. In addition, policymakers must evaluate and help the IEO sector fund the necessary consumer incentives to scale deposit systems and the infrastructure needed to help improve, for example, overall recycling rates.

Guiding principle #7: Policy recommendations must be informed by the input of a broad coalition.

Sector recommendations. Policymakers should engage with a coalition of private, public, and civil society stakeholders, with clearly defined roles and responsibilities. This coalition (discussed in detail in **chapter 5**) should be led by IEO sector players, but include a wide range of:

— Private stakeholders (for example, packaging suppliers, waste management companies, retailers, innovators)

— Public stakeholders (for example, governments, cities and municipalities, municipal waste management providers)

— Civil society stakeholders (for example, forums, NGOs)

Prior to finalizing policy and recommendations, policymakers must engage with members of this coalition to understand and incorporate different perspectives across the value chain.

End-to-end consumer education will be one of the most critical collaboration areas and overarching objectives of the coalition.

Chapter 5: A multi-stakeholder coalition—underpinned by a fact-based dialogue—is required to deliver the right circularity solutions

A coalition spanning private, public, and government stakeholders—and underpinned by fact-based dialogue—is required to achieve and scale the most effective circularity outcomes while balancing economic, environmental, and consumer dimensions.

Implementing circularity solutions involves a complex value chain with multiple, highly diverse stakeholders. To coordinate cooperation and alignment in scaling the proposed circularity solutions, a coalition of private, public, and government sector stakeholders should be established with clear roles and responsibilities outlined for each key stakeholder (see figure 15).

Figure 15
A multi-stakeholder coalition is required to deliver this combination of circularity solutions

1 **Consumer education**
- — Encouraging circular consumer behaviors
- — Streamlining systems across sectors
- — Science-based narrative

2 **Infrastructure**
- — Developing circular infrastructure, off-premises, at scale
- — Incentivizing circularity through policy

3 **Knowledge sharing**
- — Developing a common language for circularity
- — Establishing best practices

4 **Opportunity to test and learn**
- — Drive innovations
- — Offer testing environments
- — Incentivize the right consumer behavior

5 **Harmonized legislation**
- — European-level legislation defined prior to member-state legislation
- — Harmonization at European level (avoidance of fragmentation)

Sources: Kearney analysis

Private stakeholders

Packaging producers. Packaging producers need to drive innovations that meet the system demands on food safety and recyclability, as well as minimizing the risk of simply replacing paper-based littering with plastic-based littering. Producers can also play a role in redesigning packaging so that less material—or smaller materials with the same functionality—can be used.

Larger franchisor IEO chains. The larger chains and franchisors need to work toward centralized and consistent circular strategies and utilize the franchise network scale to drive effective implementation. Larger IEO chains can also help set the standard for the sector on required commitment and investments to create the most sustainable outcome for packaging that is compliant with current and future regulations. It is key for the IEO players to use the coalition approach proposed by this study to encourage investments in the industry to effectively deliver the best economic, environmental, and consumer outcomes—all while complying with current and future regulation.

Independent smaller IEO players. While smaller IEO players are unlikely to lead the development of circular systems, they must be included and empowered to help reshape consumer behaviors. For example, when designing a shared deposit or logistics system, smaller players must be able to opt in without making a large upfront investment, which would effectively exclude them from adopting circularity solutions.

Innovators. Introducing new innovations to enable circularity solutions at scale is crucial. However, it remains unclear whether the lead will be taken by existing IEO players, start-ups, logistics players, tech companies, food delivery platforms, or others. The role of innovators is to:

— Provide IEO players with additional data and visibility to further understand how to tackle the packaging waste challenge

— Support piloting across key areas of opportunity

— Drive innovations at a small scale, developing proofs of concept to be replicated more broadly

— Identify key consumer drivers and testing incentive models. Examples include start-ups such as:

  — Grey Parrot's AI waste recognition system (which enables MRFs and recyclers to monitor, audit, and sort waste flows at scale)

  — Nord Sense's smart collection bins for data-driven waste management

  — Loop's reuse systems—a global reuse platform enabled by a multi-stakeholder coalition

Private waste management companies and recyclers. Collaboration across packaging producers, IEO players, waste management companies, and recyclers is key to overcoming the challenges of low recycling rates for foodservice packaging. For example, waste companies need to:

— Accommodate separate collection for foodservice waste streams

— Help bulk volumes to create a better opportunity for recyclers

— Support other types of mediation between waste providers and recyclers to ensure high recycling rates

— Play a role in tracking and measuring waste

Retailers. The IEO sector can learn from retailers by understanding the challenges they face in scaling, ways they have effectively implemented consumer education, and the impact of implementing circularity models such as eliminating plastic bags. In addition, retailers are increasingly developing foodservice offerings with food-to-go and coffee, and will also need to develop circular models and address similar challenges to the IEO sector. Actively sharing key learnings and challenges across sectors will help accelerate the transition to circularity.

Public stakeholders

Municipal waste management systems. Circularity solutions need to be matched with public waste management systems to ensure success. This includes adequate sorting stations, waste flows, and recycling facilities suitable for foodservice packaging, as well as clear and consistent consumer education. Although larger players may have the opportunity to engage in private waste management solutions (if allowed), smaller players must opt into existing systems without an upfront investment (see the considerations for smaller IEO players outlined above).

Cities and municipalities. Cities and municipalities play a crucial role in providing the infrastructure required for circular solutions, ranging from municipal waste recycling streams to sorting stations with adequate, effective consumer guidance. Cities also play a leading role in changing consumer and business behaviors: for example, the implementation of city-wide initiatives can target a large share of the population in a single hit.

Governments. Governments need to encourage and facilitate circular solutions that create the most effective circularity outcomes through incentives such as targeted subsidies, tax benefits, and EPR schemes. They also play a key role in harmonizing consumer information such as recycling schemes, color codes, and labeling, across cities and sectors, and perhaps also across member states. Instead of penalizing first movers, governments must incentivize private sector players to test new circularity solutions by ensuring that they can achieve a positive return on their investments, while also generating positive environmental and consumer outcomes.

Other stakeholders

NGOs. NGOs' role in influencing and educating consumers and businesses in circular models is key and needs to be carried out in a fact-based way that takes the full economic, environmental, and consumer impact of the solution into account. NGOs also need to act as informal gatekeepers by ensuring that the selected circular solutions are driving enough change, while still following a realistic timeline that enables the private sector to implement and scale.

Platforms and networks. Platforms and networks, such as the World Economic Forum (WEF), are committed to supporting a transition toward a more circular economy and can provide the opportunity to work with a wide range of stakeholders to share lessons learned and challenges in a non-public environment. Platforms can also guide IEO players on measurement and reporting standards across circularity metrics, as well as supporting future pilots.

Circular solutions can only be effectively scaled through broad collaboration and partnerships across value chains and stakeholders, across private, public, and civil sectors. Forming a coalition including these players and ensuring a fact-based dialogue is required to move the needle in the transition to an effective circular economy for the IEO sector.

Conclusion: Achieving Europe's circularity ambitions for the IEO sector requires a mix of circularity solutions tailored to consumption formats

Europe must balance economic, environmental, and consumer factors in developing an effective circularity strategy for the IEO sector. While the EU, via PPWR, proposed a framework significantly reliant on reuse to tackle circularity, this study concludes that only a tailored, multi-solution approach (for example, both requirements and targets) will allow Europe to meet its circularity ambitions while balancing economic, environmental, and consumer outcomes.

Based on our assessment of different circularity solutions for the IEO sector—reduce/replace, reuse, and recycle—we conclude that:

1. **Better economic, environmental, and consumer outcomes can be achieved by scaling existing circularity solutions and know-how, such as recycling.** Circular solutions in the IEO sector need to consider the importance of takeaway consumption, which drives about 70 percent of the sector. Improving recycling solutions shows the best environmental outcomes in the short term, notably for takeaway where reuse models can lead to negative environmental outcomes. In addition, improved recycling is expected to cost significantly less than other circularity solutions, due to its existing scale and the infrastructure already in place. Improved recycling therefore provides the best immediate opportunity for Europe to improve circularity.

2. **"Blanket" circularity solutions and targets can generate negative economic, environmental, and consumer outcomes for the European IEO sector.** This study finds that a rollout of reuse models across packaging types and channels can lead to:

   — Increased packaging waste volumes

   — A sharp increase in plastic materials

   — An increase in GHG emissions

   — Added stress on water and energy systems

   Lastly, the ecosystem cost required to implement reuse at proposed targets is estimated to be about €5 billion for dine-in and more than €15 billion for takeaway (respectively representing approximately 4 percent and 12 percent of total sector sales in 2021). This would put a significant toll on IEO businesses, and across the broader value chain. While it is clear reuse can play an important role for dine-in consumption the IEO sector requires time to develop and test the right models before rolling out at scale.

3. **No single circularity solution will, on its own, solve the sector's waste footprint. Europe must accelerate investment and rollout of both reduce/replace and reuse solutions in parallel.** Recycling alone will not be sufficient to drive the required level of circularity for the IEO sector and will not be enough for Europe to achieve its ambitious circularity targets. Instead, Europe must explore a range of other solutions, starting with compostable packaging design (already in place, but in need of further investments) and infrastructure to support the compostable value chain. We have found that compostable packaging is a high-potential solution that should be further explored by IEO players, in particular for takeaway consumption where visibility and influence over consumer behavior is limited.

4. **Realizing Europe's circularity ambitions and adopting the right circularity solutions for the IEO sector requires a multi-stakeholder coalition.** Scaling multiple circularity solutions requires an ecosystem-wide, end-to-end approach. Stakeholders across the value chain—including private, public, and civil sectors—need to work together to develop a set of mixed solutions to ensure efficient and effective circularity. Too often, we have seen overheated debates both for and against single solutions. Instead, we argue that stakeholders need to agree on a set of fact-based, pragmatic, and mixed solutions that deliver the best possible economic, environmental, and consumer outcomes for this critical sector.

As momentum continues to build toward greater circularity, Europe must act now to implement a robust policy framework to assess, select, and scale the right mix of circularity solutions while ensuring legislative harmonization at a European level.

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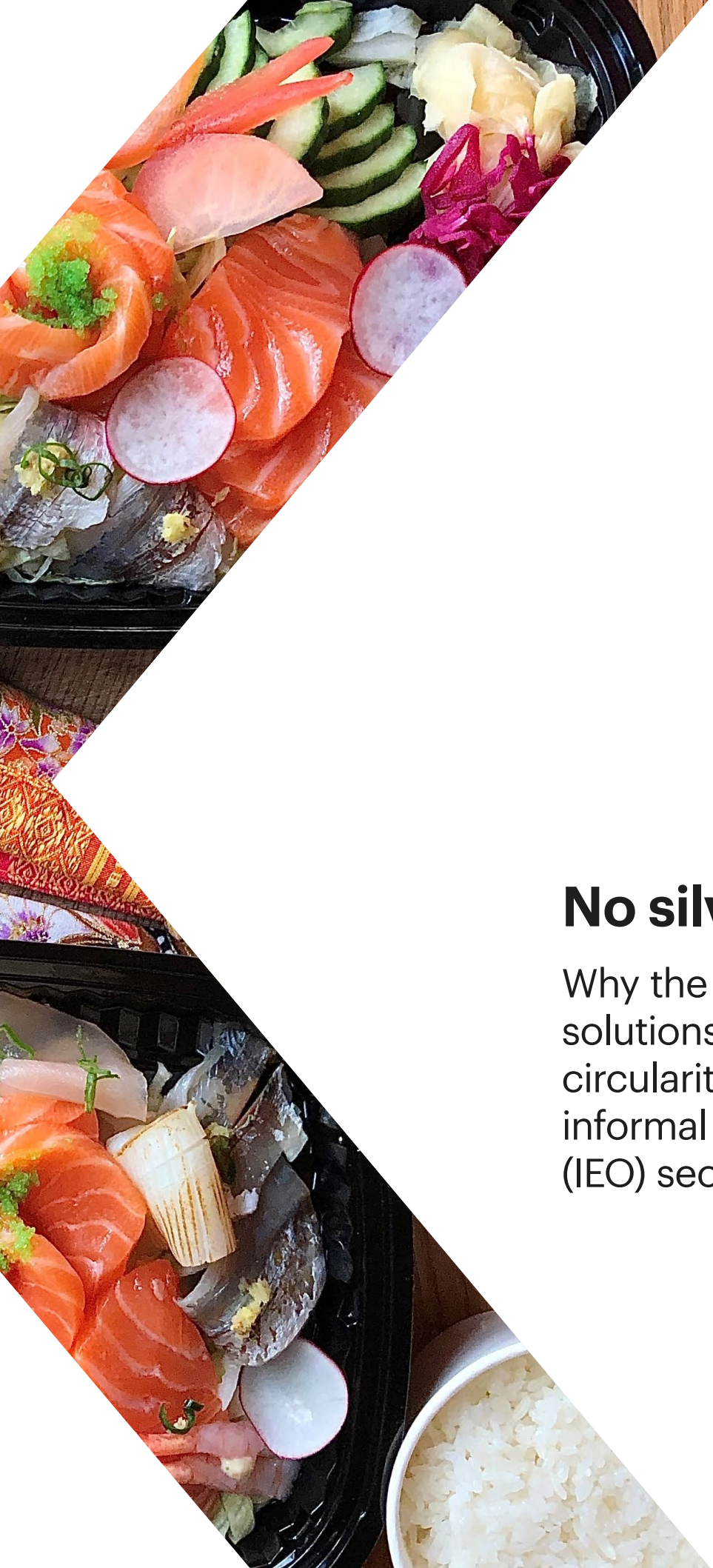

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Kearney, Stockholm

No silver bullet

Why the right mix of solutions will achieve circularity in Europe's informal eating out (IEO) sector

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